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Vol. 22. 218 WILLIAM STREET, NEW YORK. No. 5

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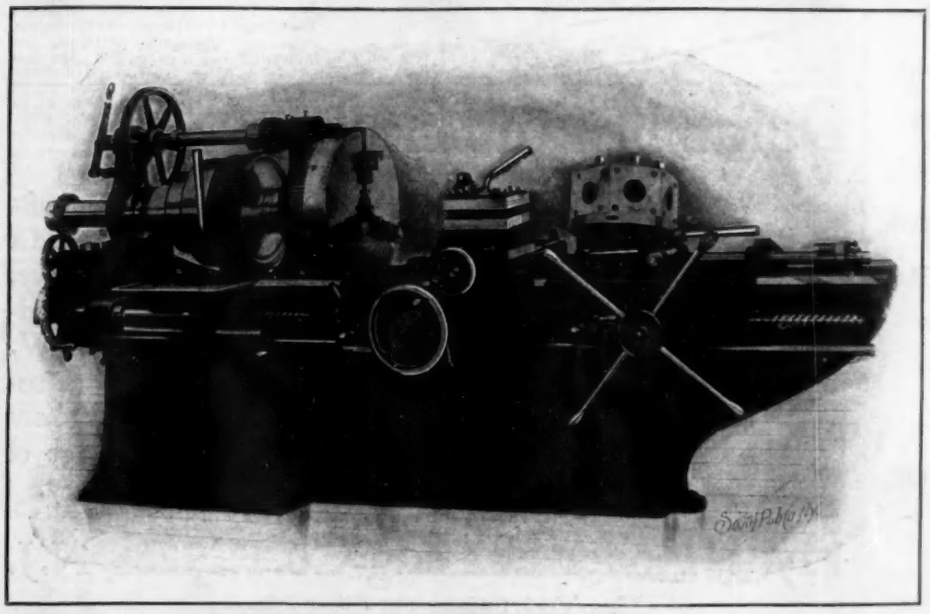

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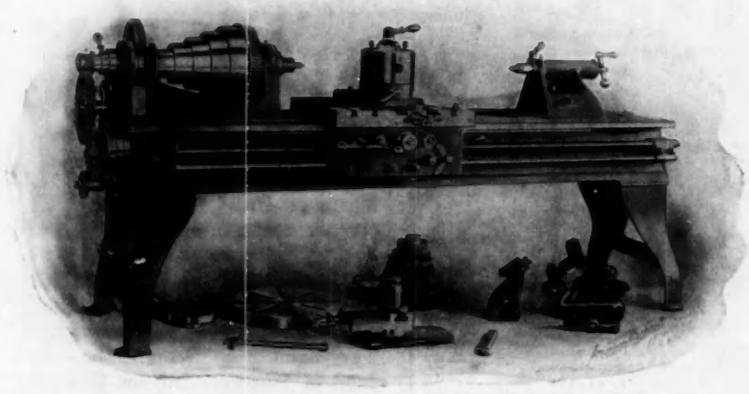

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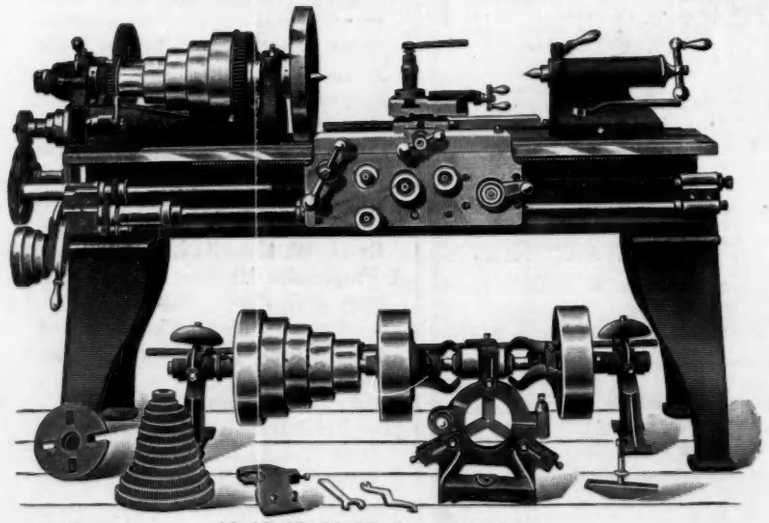

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AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION

VOLUME 22 NEW YORK, THURSDAY, FEBRUARY 2, 1899 NUMBER 5

Wetting Coal.

BY W. H. WAKEMAN.

The practice of wetting soft or bituminous coal seems to be favored by some engineers and firemen, while it is condemned by others. This being true, it looks like a case where doctors disagree; and then who shall decide? There are two classes of men whose opinions are worth but little in such cases, and one class is of those who are always trying to find the easiest way to do whatever falls to their lot, and the other is those who have got into the habit of doing certain things in certain ways, without being able to give any reason for their practice. I do not mean to say that the hardest way is always the best, nor yet that the easiest way will not secure good results, but I do protest against the practice of allowing the necessity of putting forth a little more energy to prevent a man from doing satisfactory and economical work.

Now it is much more work to handle soft coal that is saturated with water than it is to shovel in dry coal, and perhaps this fact may influence some men about deciding which gives the best results. The purely scientific and theoretical man asserts that there is no economy in wetting the coal, because the water is decomposed and it requires as much heat to do this as we get back by the reunion of the gases which we call combustion. Furthermore, it is possible for a direct loss to occur on account of the process, as it is almost impossible for changes of any kind to be made without some loss. Still we find that the locomotive fireman almost invariably wets his coal, for unless he does so, much of it is drawn through the tubes and out into the stack before it has a chance to burn at all. Where soft coal is burned under stationary boilers, the fires are frequently forced much more than they could be unless forced draft was used, and here it pays to wet the coal, for it prevents the soot from accumulating in the tubes, thus keeping the heat from acting directly on the iron or steel. Another reason why it pays to wet the coal is because it cokes up quicker, and although this makes it necessary to break up the fire at short intervals, still, if the coal is formed into large masses, it will not fall through the grates, as the fine particles always do when stirred up.

When the experiment of throwing a shovelful of fine, dry, soft coal into a furnace where a brisk fire is burning is tried, it shows that it flashes into flame at once, hence the heat becomes greater in a place where it is great enough already, so that the best results are not secured, but with wet coal the process of combining the gases or of producing combustion is retarded until they have passed further along on their journey to the stack, where the heat can be applied to better advantage, and hence more satisfactory results secured. The vapor so formed probably assists in promoting combustion, for those who have tried both the blower and the steam jet affirm that while the clinker formed by the former is hard and not so easily broken up, that formed where the latter is in use is much softer and more easily broken, so that it will fall through the shaking grates.

Some Pump Problems.

BY W. H. BOOTH.

I was considerably interested by the letter on "Crank Motion" in the "American Machinist" of November 17. The crank is an awkward appliance for some purposes. As I have stated before, I am interested in artesian pumps, and I have always endeavored to make the work done by the crank equal on each stroke. To do this I balance at the crosshead with a lever on the marine air-pump method. I balance all the weight of the rods and half the weight of the water. I have therefore no weight of rods on the crank-pin, and the net work of the pump is equalized in such a way that the spur wheel on the crank-shaft requires to have less than half the strength that it would have in a wholly unbalanced pump. The result of doing this is, that at both the top and the bottom centers the spur wheel for a moment backlashes, and there is a noise, even though I use teeth only half a pitch long and mesh close. I had ascribed the fault to the whipping action of the balance weight, but in this I have now come to the conclusion that I was partly wrong. And this has led me to another train of thought. When the crank is on the top center, with the rods neutral, the bottom brass of the connecting rod is pressing upward on the pin, being forced upward by the balance weight. The crank-pin has, in fact, to force the connecting rod down against the resistance of the balance lever. Thus from the top to the bottom of the stroke the pinion is pressing forward the wheel. Arrived at the bottom of the stroke the center is passed with the connecting rod still pressing upwards on the crank pin with a force of half the weight of the water, due to the balance weight. There is supposed to be the whole weight of the water acting downwards, so that the supposed and intended net load is a downward load of half the water weight. Actually, however, what occurs? There are a considerable number of rods. Nominally they are one straight line from end to end; actually there is a small angular deviation from the perfect straight line at every joint, and if we could see their center lines this could be perceived. Such as it is, it is intensified on the down stroke by any resistance of the bucket to being pushed down. Hence the rods commence their upstroke a trifle shorter from end to end than their full length. The weight of the water column is upon the lower valve. None of it comes on the bucket until this begins to move upward, but, nevertheless, the bucket is held very firmly against movement by the incompressible water upon it, or rather against it. Assume that the rods when under full stress become one-eighth of an inch longer from end to end, owing to their assuming a straighter line and to the minute extension under load. It is plain to be seen that, after the bottom center has been turned, the pull upwards on the crosshead, due to the balance weight, can take effect through the distance of ⅛ inch before the bucket begins to move. Let us figure how far the crank pin will move for this ⅛ inch. The crank is 12 inches in length. What angle must a radius line of 12 inches make with another line in order that the versed sine may be ⅛-inch?

In Fig. 1 *C A* is the crank 12 inches long, *B* is the angle moved through from the dead point, and *V* is the versed sine of that angle. The ratio of ⅛-inch to 12 inches is 1-96, or 0.0104, and, from any pocketbook, this is the value of the versed sine of a trifle over 8 degrees 15 minutes. Now in our figure the line *S* is the sine of the angle *B*. The value of the sine of an angle of 8¼ degrees is found in the trigonometrical tables to be 0.14349 of the radius. Hence $12'' \times .1435 = 1.722''$, or nearly 1¾ inches. This is the virtual crank arm of action of the balance pull, tending to push around the spur wheel and drive the pinion, before the bucket takes its load. As this is the wrong way it implies backlash, and is to my mind the chief cause of the trouble. A rod extension so little as ⅛-inch is not much, and much less would have the same effect.

It is plain to see that there is good reason for the slight backlash. Now, with the most careful workmanship, it is not possible to make a line of pump rods absolutely straight; nor, if they were straight, would they remain so on the down stroke. We may take it that they will become a trifle longer when loaded than when unloaded.

What is required to cure the backlash is to bring the weight of water upon the bucket before the crank pin gets past its dead point. I have never done this, but I think it may be done under certain conditions. Suppose we know that the yield of the borehole is obtainable at a certain water level. The pump barrel should be above that point, so that, when at work, the water level is a little below the barrel. Then if we put a small leakhole through the pump barrel and close it by a little valve, so that this little valve is opened by the bucket in the last quarter inch of its descent, the water will run from under the bucket and escape out of this leakhole and back into the borehole. The leakhole should have a pipe to it leading below the pump level in the borehole. By this means a portion of the water between the bucket and the lower valve can escape. The escape of a couple of cubic inches will be sufficient. This will remove the pressure of the water column from off the lower valve and compel the bucket to take it. The weight will put the rods under full tension, and they will straighten out to their full length, and, as soon as the crank passes the dead point, it will have the full bucket load upon it, and the balance weight will do as it is intended to do, and simply relieve the crankpin of half this load; but it will not now force the crank suddenly forward the amount of stretch of the slack rods. The delivery of a pump would not be sensibly diminished by this. The idea presupposes a non-leaking bucket, as this would vitiate the action of the small leakage, and a large leakage would not be desirable. Crank action may appear very gentle, but it is not so gentle even at the slow speeds of a pump but that such a small item as a minute rod extension will show a loud effect. It is probably because of such that many engineers have given up balancing for the work, and simply balance the weight of the rods. Such a pump may be much simpler. The balance may be wholly in the spur wheel, as this must now be of considerable size. As between a pump unbalanced and one balanced at the crosshead, the former must be heavier in the crankshaft and in the spur gearing. The driving engine must be correspondingly heavier and more powerful, and, generally, the top frame must be heavier altogether. On the other hand, the balance pump is more elaborate and requires more expense in the link work of the balance gear, and, on the whole, is a more expensive piece of work, but better to look at and probably less costly to work, while it probably costs less to maintain also.

There is another point connected with artesian work which is, I think, new. Sometimes, when rods break and have to be fished for, the fishing tool is put down, and when supposed to have gotten hold of a piece of loose, broken rod, perhaps 300 or 500 feet below the surface, the line of tools is brought up to the surface and after all there is nothing on them. Such a blank draw is a great waste of time, yet it cannot be known that anything has been caught unless the additional weight of the

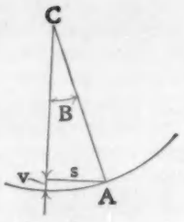
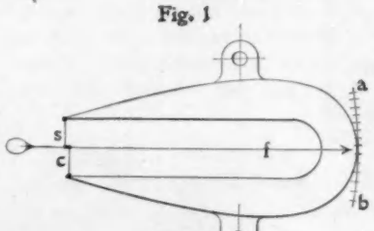


Fig. 1



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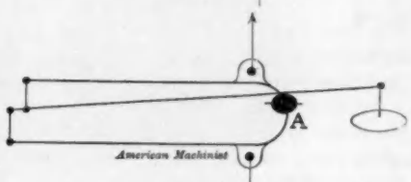

Fig. 3 W

SOME PUMP PROBLEMS.

broken piece is a quite substantial portion of the lot. In that case the steam winch runs less freely and indicates an additional load. Now there is a small weighing machine made, in the form of a cranehook, with a dial face and a finger wheel which is hung between a crane and its load and weighs every package the crane may be called to lift. This appliance can be used under all sorts of conditions, and it would be an exceedingly useful contrivance for well boring breakdowns. The line of picking up rods and tool would be let down as far as the obstruction, then lifted clear of it and weighed. This done, and the position of the index carefully marked, fishing operations would begin, and when the piece was thought to be caught the whole would be lifted to the same position as before and again weighed, the difference, if any, representing the caught piece, and the line of tools could be drawn up with some confidence. There is no necessity for special accuracy. Any appliance that will show more or less weight is sufficient to show whether a line of tools has been added to or otherwise. The appliance which seems to me most suitable is, however, not a strictly lever machine, but something of the form of a punching beam or dynamometer, as in Fig. 2, where a stout forging carries the load. It opens under the stress of the load, and the movement is indicated on the quadrant by the long pointer *f*, connected to the points of the forging by links *s* and *c*, at a short distance apart, so as to multiply the finger movement. An adjusting screw in one link would serve to bring the index to about the middle position for different loads. If changes of temperature could be proved to have any effect between two weighings, the forging might be wrapped in non-conducting material. By trial I would divide the quadrant into divisions, each representing one length of rod. Thus, suppose one rod showed 1-16 of an inch of finger movement, the range for 400 feet would only be 2½ inches. It would be better to aim at an eighth of an inch of movement per rod if possible, so enabling a very small obstruction to be determined.

Where a lever machine with a scale pan for weights is thought desirable, the form of Fig. 3 may be considered, with a hinge at *A* and a scale pan on the secondary lever. As sketched the weight of one pound in the scale pan will balance about 160 pounds of load, so that 1½ tons of rods would be balanced by about twenty pounds.

The difficulties about knife edge bearings or balls incline me to the solid forging, if this can be shown practicable, and it would appear likely to be, in the face of the fact that the spring of a cylinder cover has been utilized to take an indicator diagram. Less cumbersome contrivances would be coiled springs in compression, fitted with multiplying index levers, or, possibly, with a water filled "aneroid" disk to read off the load difference, and it does not seem unreasonable even to use the "aneroid" disk itself in stronger form as the sole sustainer of the load.

Experience of any of the foregoing could show how they would act in daily use, but they are ideas that suggest themselves as a means of saving a good deal of time in fishing operations. I have seen men confident of having an additional eighty feet to a previous load of only 260 feet and prove to be mistaken. Probably not one of the appliances I have suggested would have failed to indicate so large a proportionate addition as the above. In the absence of a special appliance it would not be difficult for a careful man with a crowbar placed at fixed points by means of filed notches to take a weight on a platform weighing machine even of small capacity.

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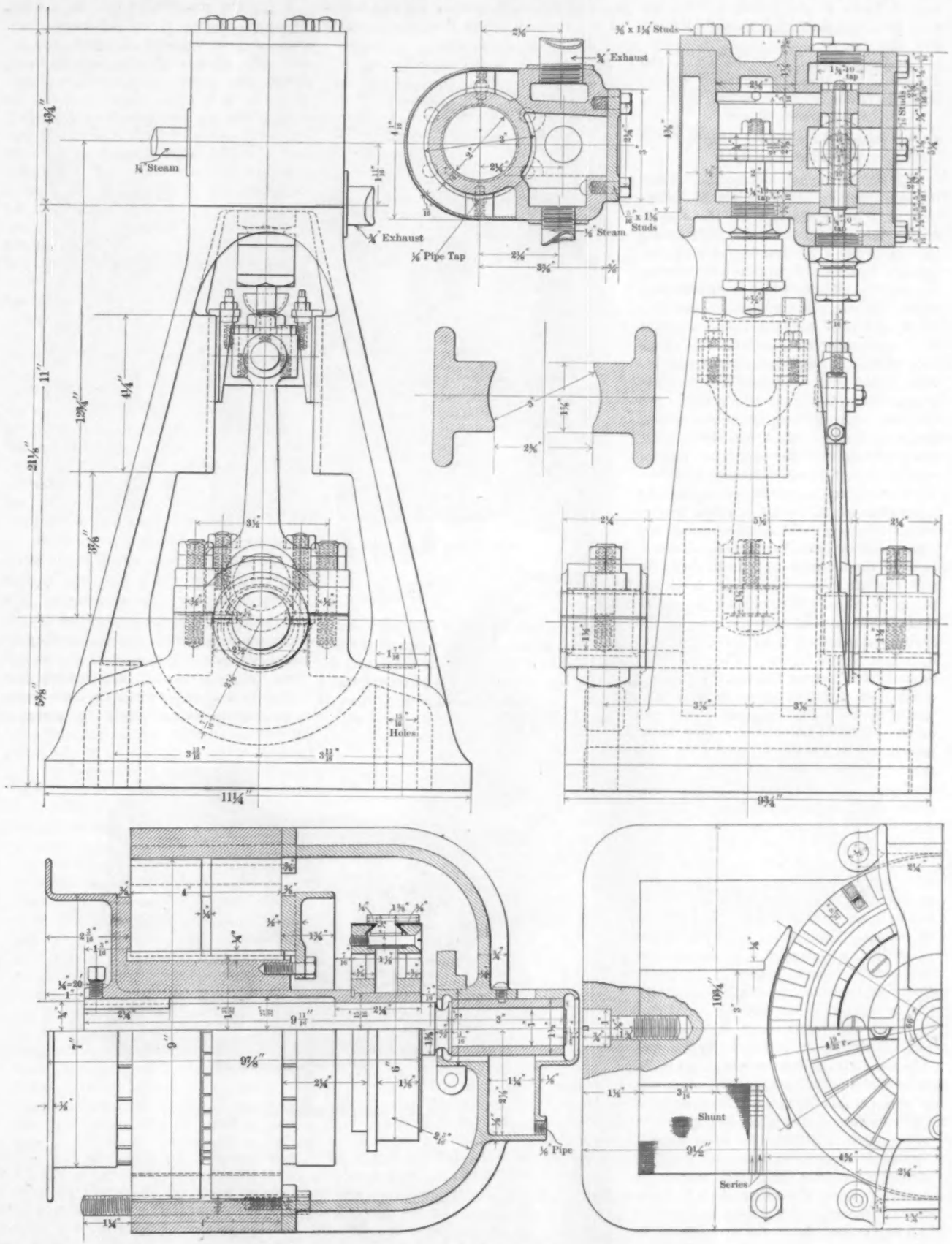
Design for a Small Engine and Dynamo.

Our readers will recall the publication, in our issue of December 8 last, of a half-tone illustration of a small direct-connected steam engine and dynamo. Through the courtesy of the builders, the B. F. Sturtevant Company, we are enabled to present herewith working drawings giving most of the working dimensions and forming an interesting study in small but



A SMALL ELECTRIC GENERATOR AND DIRECT CONNECTED ENGINE.

rugged engine and dynamo design. The drawings are self-explanatory and need no extended comment. We remark, however, that the long bolts extending through the magnet frame at the bottom are for the purpose of securing the dynamo to the engine base.

The rated capacity of the set is 1½ kilowatts, the speed being 1,000 recolutions per minute.

A Two-Piston Rotary Engine With Variable Cut-Off.

The accompanying illustrations show the construction and principle of operation of a novel member of the rotary-engine family which is not undeserving the attention of our readers for the ingenuity which it embodies and for the range of possibilities which it covers. The engine has two pistons, each a sector of a circle, and both having a common center of revolution, which is also the axis of the true cylindrical chamber in which they revolve. One of these pistons is fastened to a central shaft, not the pulley shaft, and the other is fastened upon a sleeve turning freely on the same shaft, the sleeve being prolonged through the inner flat face or end of the cylindrical chamber, and having a crank on its projecting portion. The shaft attached to the other piston is prolonged to project still farther through the sleeve, and this also has a crank attached. Both of these cranks operate to drive the pulley shaft from which the developed power is taken. The axis of the pulley shaft, while parallel with the axis of the cylindrical chamber, is not coincident with it, but is placed higher. This shaft has upon the end nearest the steam cylinder a crank disk with two crank pins diametrically opposite and equidistant from the center. One of the piston cranks is attached to one of these crank pins by a short connection, and the other crank is similarly attached to the other pin. The pulley shaft of the engine has of course a uniform speed of rotation, and then, on account of the eccentricity of this shaft to the center of motion of the steam pistons, it is evident that they cannot also have a uniform revolution, but must be alternately accelerated and retarded in their movement. The revolution of the pistons is, in fact, an adaptation of the familiar Whitworth "quick return" movement. Both pistons, of course, revolve constantly, but on account of this varying speed they approach and recede from each other at each revolution, or, rather, twice for each rotation of the pulley shaft. The flat radial faces of the pistons are made to come very close to each other at a certain point of their revolution, and when they are at this point steam is admitted between the contiguous faces, and the action of the steam in tending to drive the pistons apart is the means by which the pulley shaft is driven and the power of the engine is developed.

The first cut shows the principle of the engine quite clearly. In Fig. 1 both shafts are in line, and with the cranks connected as shown, the shafts must always rotate at the same speed. In Fig. 2 the shafts are not in line, and they can therefore only move at the same speed at the two points of the rotation where they are changing

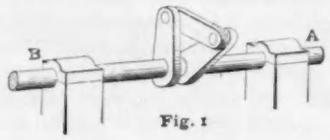


Fig. 1

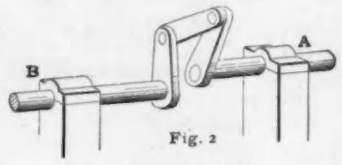


Fig. 2

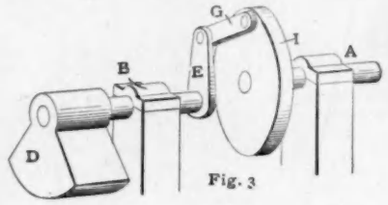


Fig. 3

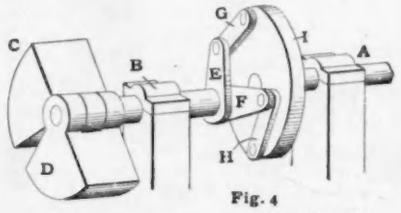


Fig. 4

American Machinist

from relatively faster to relatively slower and *vice versa*. In Fig. 3 one of the pistons has been placed on the shaft, and the revolution of the piston is of course faster and slower with the changing rotation of the shaft which carries it, the shaft *A* in each figure, which is the pulley or driving shaft, rotating at a uniform speed. In Fig. 4 both the pistons are shown, one on the shaft and fastened by the middle hub, and the other on the sleeve and fastened by the two outside hubs, both the sleeve and the shaft having the cranks and connections as previously described, and both the pistons having their alternately accelerated and retarded rate of revolution.

It is to be remembered that the pistons, although rotating at varying speeds, turn constantly in the same direction, and so, when the steam is admitted between them, while the pressure upon the face of one piston tends to drive it around in the desired direction, and also the pulley shaft to which it is connected, it is just as certain that the same steam pressure upon the face of the other piston must press backward and tend to drive that piston the other way from that in which all the rotation occurs. It is therefore not immediately evident why the steam should cause the pulley shaft to turn at all, and much less to turn with any driving power. The fact, however, is that the leverage of the pistons in relation to the pulley shaft is constantly changing, as is evidenced by their changing speed, and when the piston is moving the fastest, it has of course also its greatest leverage. With steam between the pistons, as long as one piston is increasing its distance from the other, it is of course going the faster, and has therefore the greater torsive effect upon the pulley shaft. It is this difference in effective leverage which enables the steam between the pistons to do its practical work of driving the pulley shaft.

The points in the periphery of the working chamber at which occur the various events of the cycle do not change. The positions of the piston faces when the pistons are close to each other, when they are farthest apart, or when they are in any other relative position, approaching each other or receding, are always the same, and as the pistons are their own valves of admission and discharge, and their movement the only valve motion, the steam and exhaust ports can be unerringly located, and when once right must be always right. All the incidents connected with the admission, cut-off, expansion, exhaust and

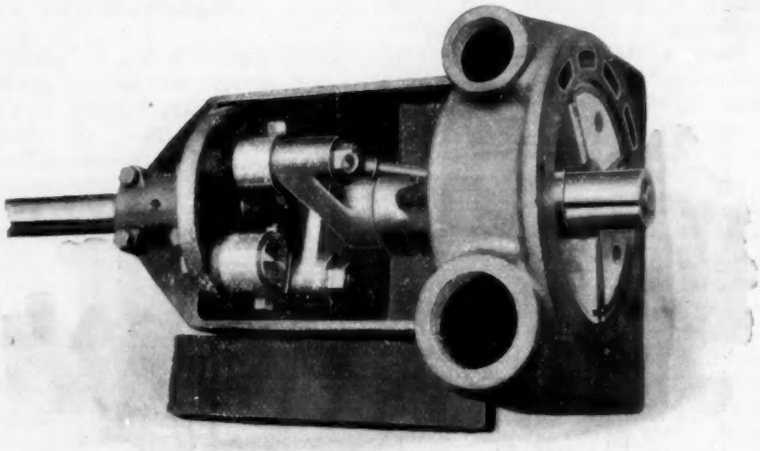


FIG. 5. LOOKING DOWN ON THE CRANKS.

compression of the steam are as completely and sharply provided for as in the reciprocating engine. In Fig. 5, which is a view looking down on the main part of the engine,, and showing the cranks and their connections, the smaller vertical pipe opening is for the steam, and the larger is for the exhaust. The exhaust port is in the periphery of the circular chamber, or

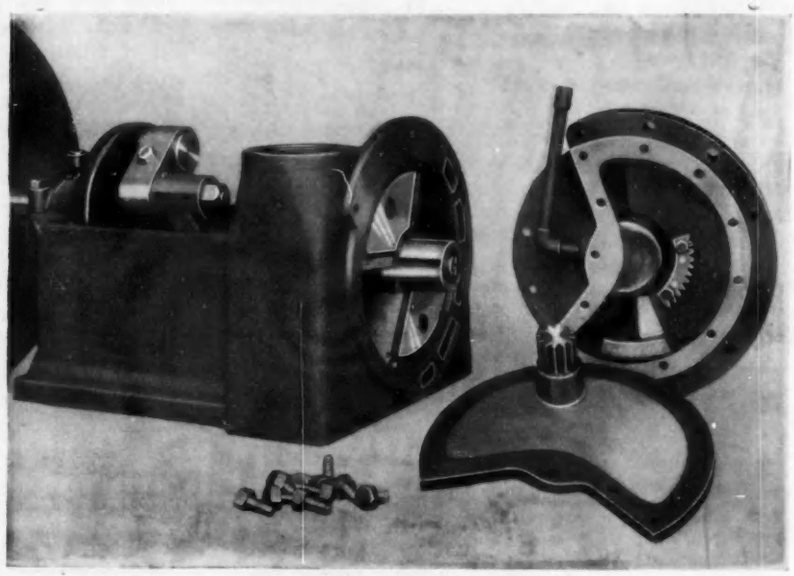


FIG 6. REAR VIEW WITH COVER AND STEAM CHEST OFF.

at the near side in Fig. 6. The detached pieces in this figure are the steam chest cover in front, and the steam chest itself standing back of it. The steam passes, by the small openings seen in the farther side of the cylinder flange, into the chest. The chest embodies at the back of it a flat plate which when in place entirely covers the open end of the cylinder. In this flat plate there is a single port or opening for the admission of steam to the cylinder, which opening shows white in the half-tone. The change in cut-off is effected by simply changing this opening, and this is effected by moving the flat semi-circular plate which is fitted to the main plate or bottom of the chest. A lug upon the face of this semi-circular plate projects down into the port so that it is flush with the cylinder-covering face of the chest. The circular rack on the back of the cut-off plate is worked by the pinion seen mounted on the cover, its spindle extending through the cover and being worked by a wrench or handle outside. As the port is made larger by the movement of the cut-off plate, the cut-off is, of course, made to occur later, and *vice versa*. In Fig. 7 the complete engine is shown with the chest taken off and standing at the side. The pistons are shown as in the position where they begin to take steam. Upon turning the pulley shaft half way around the pistons come again to the same positions, except that they will have changed places with each other. The nearer piston, moving to the right, will have advanced to the position here occupied by the other, while that other will have gone up around and down the front to the present position of the first. In this view the packing strips in the faces of the pistons are to be noted.

The engine will, of course, run as well in one direction as in the other by a suitable change in the location of the steam and exhaust ports, and such a reversal is provided for in other designs of this engine, but it is not necessary to lengthen our description by going into it. The piston shaft and the slide are made steam-tight by bearing against ground shoulders, and there are no stuffing-boxes where they emerge from the cylinder.

We do not, of course, wish to be understood as holding the opinion that in this engine all the difficulties of producing a satisfactory rotary engine have been overcome. It is presented simply as one of the most interesting attempts at their solution, and nothing except the test of time and use will determine its degree of success.

This engine was built by the Parsons Engine Company, Wilmington, Del.

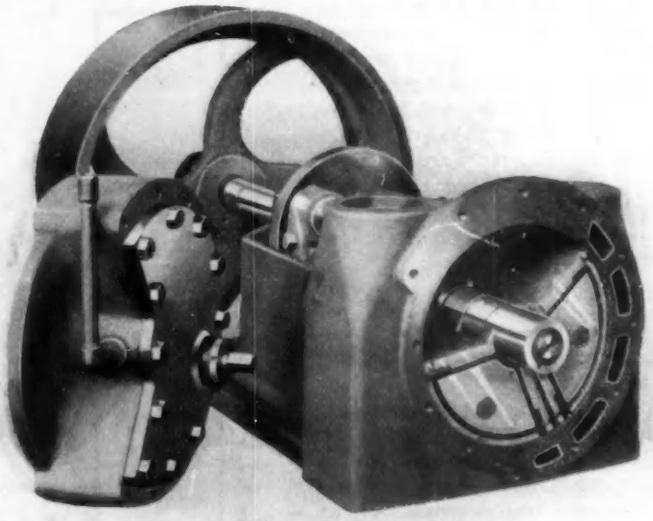


FIG. 7. READY FOR STEAM ADMISSION.

Exposition of Manufacturers at Philadelphia.

American machinery manufacturers who desire to extend their foreign trade will be interested in the preparations that have already been made for the exposition of American products and manufactures, especially suited for export, to be held at Philadelphia, and the plans that have been adopted for bringing this unique exhibition to the attention of foreign purchasers. The exposition will be formally opened on September 15, and it will continue until November 10. It has been pointed out that the forthcoming exposition offers an exceptional opportunity for gaining information concerning the commerce of other countries, their customs and commercial relations, their systems of communication and transportation, with special details of freight rates, tariffs, exchanges, and kindred subjects. The exposition will be sufficiently broad in its scope to command the good-will and co-operation of manufacturers and others interested in the development of American commerce.

A special feature in connection with the exposition will be an international commercial congress, at which will be represented not only the leading chambers of commerce of Mexico and South America, but assurance is also given that delegations from South Africa, India, Australia, China, Japan and other countries will be in attendance. This will bring together about 400 leading

merchants from all parts of the world, who will come to make business connections in the United States, and to discuss the best means of extending American trade in their respective countries. This meeting will in a measure resemble the international commercial congress held in 1897 under the auspices of the Philadelphia Commercial Museum, but will be on a much more elaborate scale. The delegates to the last congress were prominent merchants appointed by the leading commercial organizations of Spanish-American countries. During the meeting in Philadelphia and the subsequent tour to some of the principal industrial centers of this country, the expression most frequently noted on the part of these delegates was one of amazement and surprise at the degree of perfection attained by American industry. In the reports which they have made to their chambers of commerce no fact has been more strongly emphasized than that the products of the United States are not sufficiently known abroad, and that it is to the interest of a foreign merchant to make a careful examination of the field.

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Pneumatic Pyrometer and Gas Composimeter.

The accompanying illustrations show an instrument for indicating and recording furnace temperatures. A gas composimeter, by the same makers, which indicates and records the composition of gases of combustion, is based upon essentially the same principle, which is, we believe, entirely new, while the character and sources of the endorsements which the instruments have received leave no room for doubt regarding their practicability.

Taking up first the pyrometer, its basic principle is shown in Fig. 1, in which *a* is an aspirator driven by a steam jet and fitted with a regulator to be described later, and provided to maintain a constant suction in chamber *b*, this suction being shown by the water column gage *c*, A second chamber *d* communicates with *b* through an aperture *e* and has at its end a second aperture *f*. With the aspirator in action it is clear that air will be drawn through the apertures and discharged with the steam, the amount of air passing the apertures being necessarily the same. The total suction in *b*, which it must be remembered is constant, will obviously be divided by the two aper-

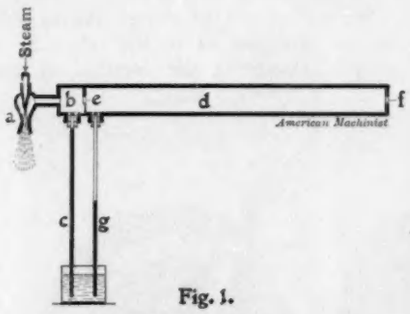

Fig. 1.

PRINCIPLE OF THE PYROMETER.

tures, and a second water column gage *g* will show the amount of suction in chamber *d*, which, so long as there is no change in the conditions, will remain constant.

In actual use the air entering at *f* is heated to the temperature of the furnace under test, while before reaching *b* it is artificially cooled to the constant temperature of boiling water. The air when passing at *b* is thus at constant temperature and density, while when passing at *f* its temperature and density vary with the temperature of the furnace under test. Under a constant state of conditions the apparatus will soon settle down to a constant action, the hight of the water gage *g* showing the suction in chamber *d*. If now the temperature of the air entering at *f* be increased, its volume will be increased and the equilibrium of conditions will be for the moment changed—the suction prevailing in *d* being now unable to draw the old amount of air through *f*, but as the air is still cooled to the old temperature before reaching *b* the suction at *b* will momentarily draw more air out of *d* than enters at *f*, which will immediately result in the increase in the suction in *d*, this increase being shown by the gage *g*. The suction in *d* will continue to increase until the equilibrium of

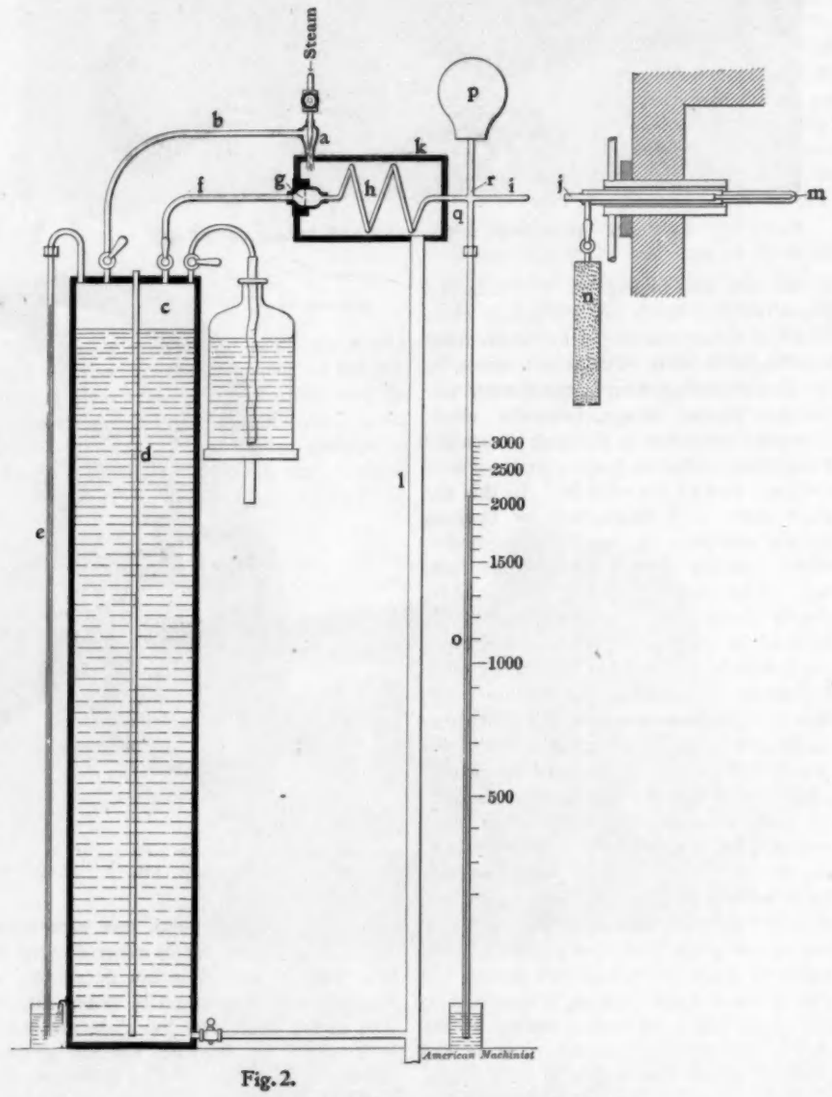

Fig. 2.

DIAGRAMATIC VIEW OF THE PYROMETER.

conditions has been again established, since ultimately the suction must be so divided as to again draw the same amount of air through both apertures, and the new suction in *d* necessary to do this will obviously be shown by the gage *g*. It will thus be seen that every change in the temperature of the incoming air will be shown by a corresponding change in the hight of the gage *g*, and if the incoming air is at the temperature of the furnace, the hight of the gage will indicate that temperature. Moreover, by the addition of a recording vacuum gage, a continuous record of the temperature will be made, while the water column gage will furnish a constant check on the accuracy of the recording gage.

The air taken is not, however, drawn from the furnace, since the varying density due to the varying composition of the furnace gases would vitiate the results, and because the dust of the furnace gas would clog the apertures. The tube projecting into the furnace is therefore surrounded by a second tube, closed at the furnace end, and drawing air from the outside.

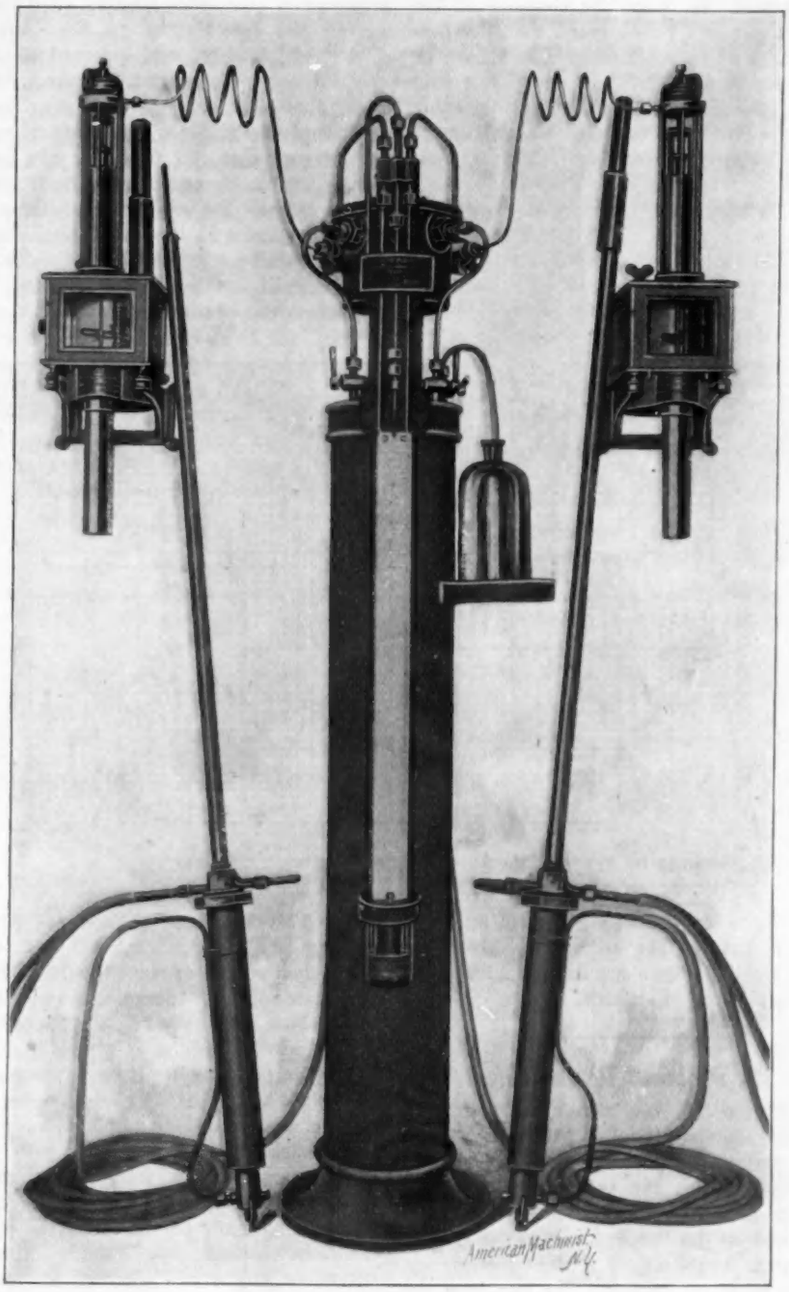

FIG. 3. THE PYROMETER COMPLETE.

A diagramatic view of the complete apparatus is shown in Fig. 2, the aspirator being at *a*. The suction due to this is carried through the tube *b* to the top of the regulator *c*, which is a simple tank of water with an air pipe *d* open at both ends and extending to its bottom. The aspirator having a capacity to produce a suction greater than the depth of submergence of this tube, air will enter through the tube and thereby limit the suction actually realized in the top of the tank to the amount represented by the depth of submergence, which is constant, and is indicated by the water column gage *e*, corresponding to *c* of Fig. 1. This suction is now transmitted through the pipe *f* to the aperture *g*, which is aperture *e* of Fig. 1. From this the coil of pipe *h* and connection *i j* (shown broken off, as the distance between *i* and *j* may be varied within wide limits) connects with the "fire tube" shown at the right as inserted through the furnace wall. The coil *h* is located in a chamber *k* into which the steam, water, and air from the aspirator is discharged, the chamber having an outlet at *l*, open to the air, so that atmospheric pressure and boiling water temperature due to that pressure is insured in chamber *k*, the coil *h* having sufficient surface to insure that the same temperature is imparted to the air before reaching aperture *g*.

The fire tube will be seen to comprise an inner tube (of platinum) having an orifice *m* (the orifice *f* of Fig. 1) at its extreme end and surrounded by a second platinum tube which is arranged to draw the air from outside the furnace, which air, to insure freedom from dust, is drawn through the filter *n* filled with cotton. The pipes and connections between *g* and *m* comprise the chamber *d* of Fig. 1, the water column gage *o* and recording gage *p* being connected at *q* and *r* respectively, both being graduated to show the temperature directly.

The appearance of the completed instrument is shown in Fig. 3. The regulating tank is made a base for the apparatus, the two water column gages being seen fastened to its front. The cooling chamber is located above the tank with the aspirator attached to its side. At right and left above are two recording gages, and leaning against them will be seen two fire tubes, for it is obvious that one aspirator, regulator, and cooling chamber may serve several fire tubes. Hose connections are also shown. Two of the lines of hose are for water, since the fire tube, once the platinum tips are passed, is water jacketed to prevent injury. The bottle with hose connection dipping into it, shown on a bracket on the side of the regulator tank, contains a supply of water to replenish the tank as it is drawn down by evaporation. The addition of water is accomplished by opening the cock connected with the goose neck tube, when the suction within the tank draws in water from the bottle.

It will be seen that in this instrument the gas is brought to the two apertures *c* and *f*, Fig. 1, with all conditions con-

merchants from all parts of the world, who will come to make business connections in the United States, and to discuss the best means of extending American trade in their respective countries. This meeting will in a measure resemble the international commercial congress held in 1897 under the auspices of the Philadelphia Commercial Museum, but will be on a much more elaborate scale. The delegates to the last congress were prominent merchants appointed by the leading commercial organizations of Spanish-American countries. During the meeting in Philadelphia and the subsequent tour to some of the principal industrial centers of this country, the expression most frequently noted on the part of these delegates was one of amazement and surprise at the degree of perfection attained by American industry. In the reports which they have made to their chambers of commerce no fact has been more strongly emphasized than that the products of the United States are not sufficiently known abroad, and that it is to the interest of a foreign merchant to make a careful examination of the field.

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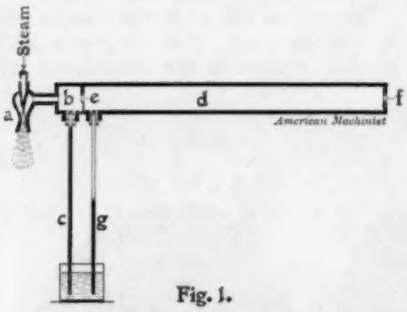

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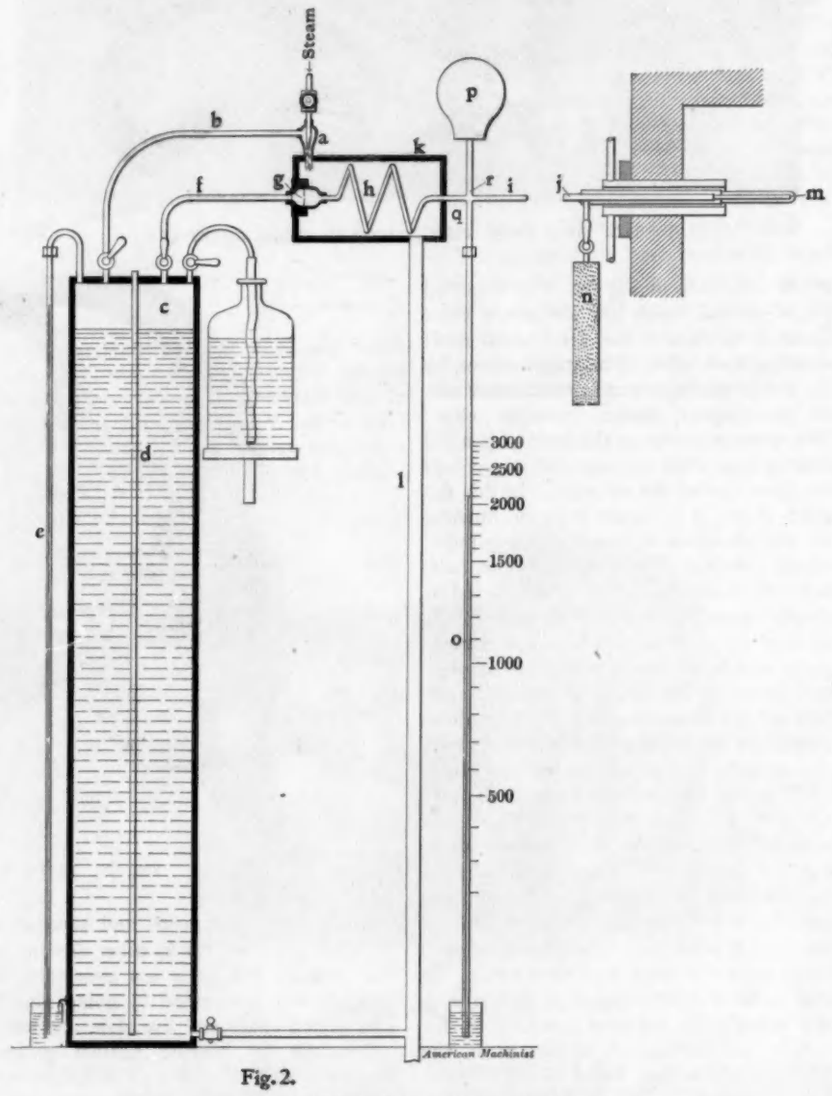

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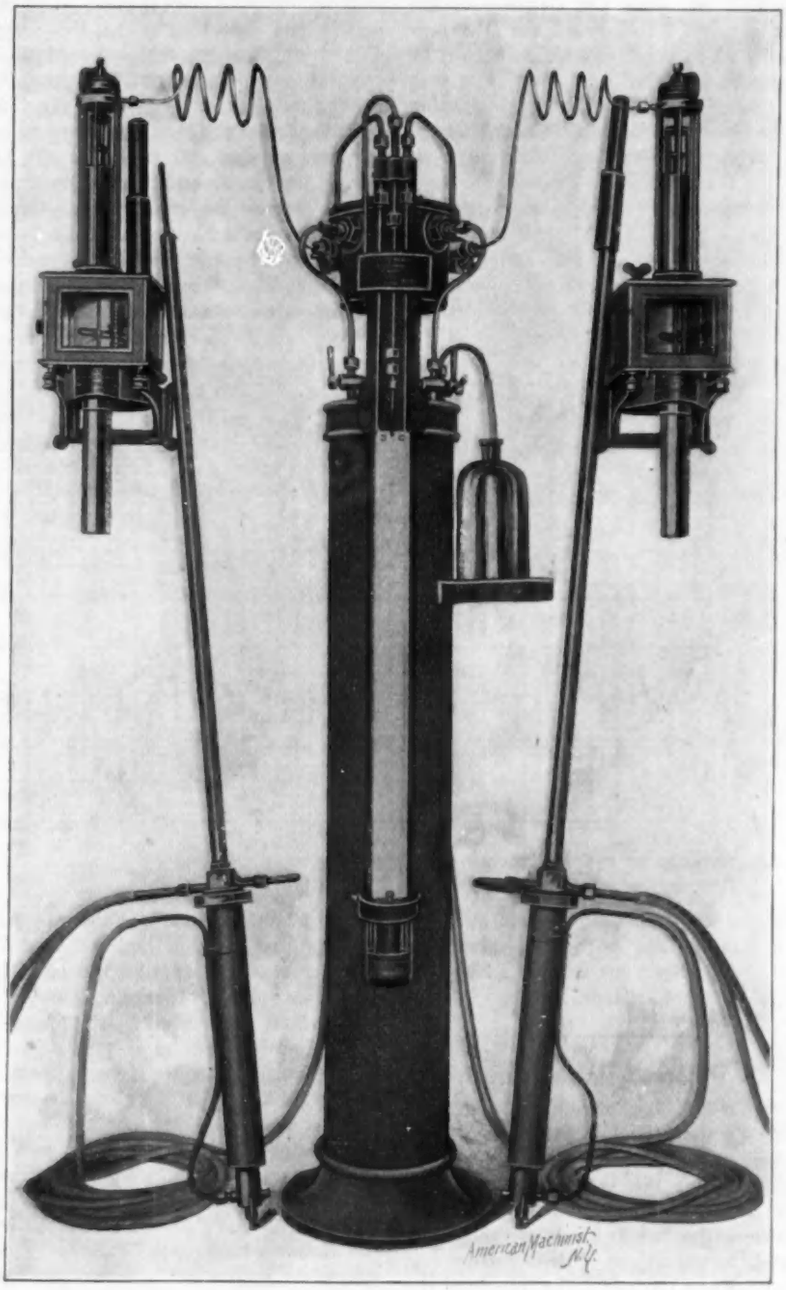


FIG. 3. THE PYROMETER COMPLETE.

A diagramatic view of the complete apparatus is shown in Fig. 2, the aspirator being at *a*. The suction due to this is carried through the tube *b* to the top of the regulator *c*, which is a simple tank of water with an air pipe *d* open at both ends and extending to its bottom. The aspirator having a capacity to produce a suction greater than the depth of submergence of this tube, air will enter through the tube and thereby limit the suction actually realized in the top of the tank to the amount represented by the depth of submergence, which is constant, and is indicated by the water column gage *e*, corresponding to *c* of Fig. 1. This suction is now transmitted through the pipe *f* to the aperture *g*, which is aperture *e* of Fig. 1. From this the coil of pipe *h* and connection *i j* (shown broken off, as the distance between *i* and *j* may be varied within wide limits) connects with the "fire tube" shown at the right as inserted through the furnace wall. The coil *h* is located in a chamber *k* into which the steam, water, and air from the aspirator is discharged, the chamber having an outlet at *l*, open to the air, so that atmospheric pressure and boiling water temperature due to that pressure is insured in chamber *k*, the coil *h* having sufficient surface to insure that the same temperature is imparted to the air before reaching aperture *g*.

The fire tube will be seen to comprise an inner tube (of platinum) having an orifice *m* (the orifice *f* of Fig. 1) at its extreme end and surrounded by a second platinum tube which is arranged to draw the air from outside the furnace, which air, to insure freedom from dust, is drawn through the filter *n* filled with cotton. The pipes and connections between *g* and *m* comprise the chamber *d* of Fig. 1, the water column gage *o* and recording gage *p* being connected at *q* and *r* respectively, both being graduated to show the temperature directly.

The appearance of the completed instrument is shown in Fig. 3. The regulating tank is made a base for the apparatus, the two water column gages being seen fastened to its front. The cooling chamber is located above the tank with the aspirator attached to its side. At right and left above are two recording gages, and leaning against them will be seen two fire tubes, for it is obvious that one aspirator, regulator, and cooling chamber may serve several fire tubes. Hose connections are also shown. Two of the lines of hose are for water, since the fire tube, once the platinum tips are passed, is water jacketed to prevent injury. The bottle with hose connection dipping into it, shown on a bracket on the side of the regulator tank, contains a supply of water to replenish the tank as it is drawn down by evaporation. The addition of water is accomplished by opening the cock connected with the goose neck tube, when the suction within the tank draws in water from the bottle.

It will be seen that in this instrument the gas is brought to the two apertures *e* and *f*, Fig. 1, with all conditions con-

stant except the temperature and the resulting density. In the gas composimeter, as applied to the analysis of flue gases, the principle of the two apertures is retained, but the conditions of temperature and density at the two are kept constant, while the change in the condition of the gas when passing them is one of volume due to the abstraction of one of the constituents of the flue gas after passing aperture *f* and before passing aperture *e*, Fig. 1. This abstraction of one of the constituents is continuous, and obviously the change in the total volume between *f* and *e* will depend on the amount of this constituent originally in the flue gas. This change in the volume of the flue gas after part of it is absorbed will obviously be accompanied by a change in the balance of the suction between *f* and *e*, and this change, as shown by the water column gage, or by a recording gage, will obviously be an index of the amount of the constituent originally present and abstracted between the two orifices.

As applied to flue gas analysis the constituent absorbed is the carbonic dioxide, which is absorbed by a solution of caustic potash. It is also, of course, filtered for the removal of dust, as well as freed from all moisture before entering the apparatus by being passed through tubes filled with calcium chloride. Before reaching apertures *f* and *e* it is passed through coils in a steam heated chamber, whereby the equality of temperature of the two apertures is insured. The only change in the condition of the gas at the two apertures will thus be seen to be its volume due to the absorption of the carbonic dioxide, which change of volume and percentage of carbonic dioxide originally in the gas will be recorded, as was the temperature in the pyrometer.

Fig. 4 is a reduced fac-simile of 24-hour autographic records of both instruments as applied to a boiler furnace, the original record being 18 inches long for a day's run and having scales which are 3 inches wide between limits. The upper line gives the temperature at the bridge wall, while the lower one gives the percentage of carbonic dioxide. Referring to the upper record the drops in temperature at intervals of about an hour show the opening of the fire door for the purpose of coaling up, while the deeper and wider gaps at 3:45 and 8:30 A. M., and at 3:30 and 9 P. M. show the cleaning of the fires. It will be observed that the percentage of carbonic dioxide as shown by the lower diagram keeps exact time with the coalings and cleanings, each opening of the fire door showing a reduction of the percentage of carbonic dioxide, as it should.

The temperature which the pyrometer is capable of indicating for a short time without injury to itself is stated to be 3,000 degrees F., while for temperatures up to 2,500 degrees F. it can be used an indefinite length of time without affecting its accuracy. The instruments are made by Uehling, Steinbart & Co., 40 and 42 Fourth street, Carlstadt, N. J.

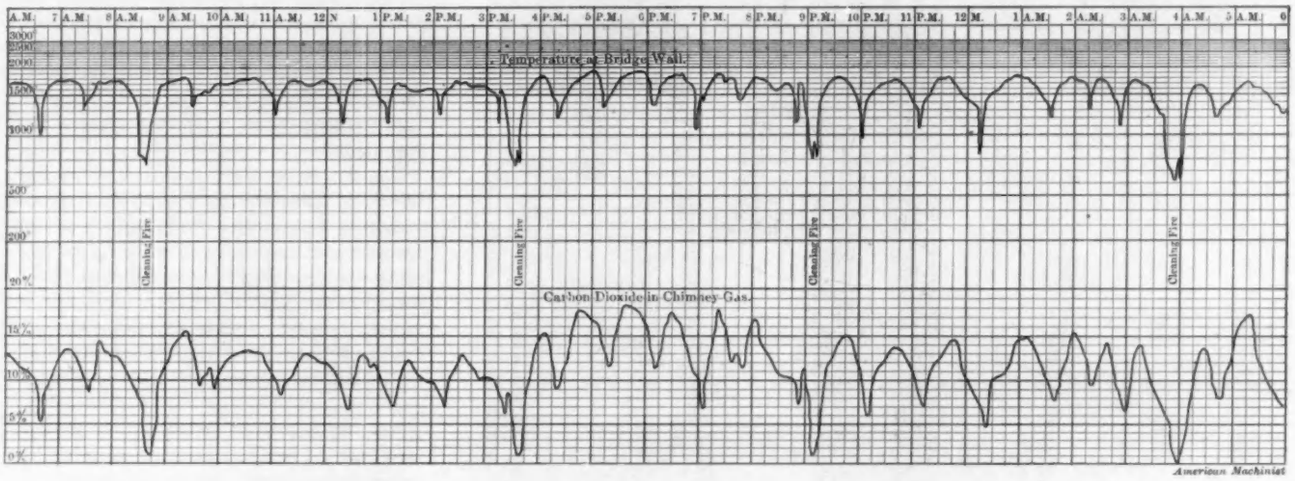


FIG. 4. AUTOGRAPHIC RECORDS OF PYROMETER AND GAS COMPOSIMETER.

A Proposed Patent Court.

During the last session of Congress Representative Hicks, chairman of the committee on patents, introduced a bill providing for the establishment at the seat of government of a court, to be known as the Patent Court of the United States, to consist of a chief justice and two associate justices. The framer of the measure worked hard to secure its enactment, but in this he was unsuccessful. However, the question is being agitated again with renewed vigor, and it may be that the pending measure will be taken up and enacted into a law before the end of the present session.

The bill provides that whenever there is filed in the Patent Office an application for a patent which in the opinion of the Commissioner of Patents interferes with any pending application or with any unexpired patent, he shall give notice thereof to the applicants, or applicant and patentee, as the case may be, and shall direct the examiner of interferences to proceed to declare the interference and to settle and determine all interlocutory matters and motions. The commissioner, after the termination of all such matters, shall then certify the interference to the Patent Court, which court shall proceed to determine the question of priority. The court shall, on receiving from the Commissioner of Patents a certificate of any interference case, set times for the parties to the interference to take testimony to prove their respective cases. On the evidence produced the court shall hear and determine the question of priority or originality of invention between the parties on the issue certified to the court by the Commissioner of Patents. After hearing and determining the case, the court shall return to the commissioner a certificate of its proceedings and findings, which shall be entered of record in the Patent Office, and if such adjudication be in favor of the right of an applicant, shall authorize the commissioner to issue a patent on the application, provided such applicant complies with the requirements of law. But no opinion or decision of the court in any such case shall preclude any person interested from the right to contest the validity of such patent in any court wherein the same may be called in question. The court is empowered to issue all necessary and proper writs in aid of its jurisdiction.

This question is of great interest to manufacturers and inventors generally. This special Patent Court would mean a great saving of time in the actual trial of cases, and consequently a great saving of money. The bill providing for the establishment of a Patent Court should be speedily enacted.

A. F. T.

Cold Swaging Machine.

Most of our readers are more or less acquainted with the extent to which cold swaging machines are now being used in manufacturing operations, bicycle spokes, which are reduced in the middle section, leaving both ends enlarged, being a familiar example of the work done by them, in addition to which they are used largely in operations performed by manufacturing jewelers and for many other purposes, including reduction and tapering of tubing. We illustrate herewith one of the latest machines for this work, our engravings giving a general view of the machine and also a section showing the arrangement of the parts. These, we think, explain themselves, and it will be understood that the dies, of which there are two and which have their opening concentric with the spindle, are forced together by means of opposing plungers, passed by the revolution of the shaft between the steel rollers shown, these rollers being fixed in a floating ring and backed up by a hardened steel ring pressed into the main casting. This machine is made by the Mossberg & Granville Mfg. Co., of Providence, R. I., and the floating ring with rolls is, we understand, arranged on the principle of their roller bearings, which are largely used for other purposes. The machine is made in four sizes, with a capacity for handling wire from the smallest size up to 2¼-inch diameter. Special pains have been taken to make the machine sufficiently heavy to withstand the constant hard usage to which such machines are necessarily subjected.

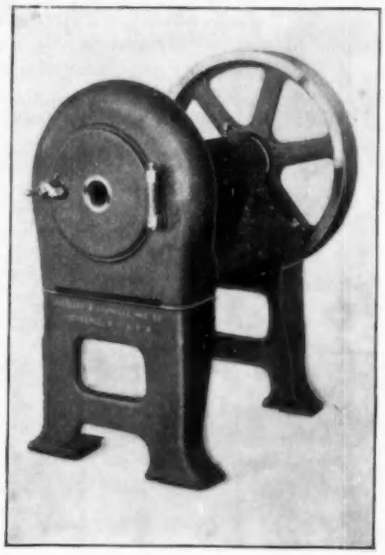
Letters from Practical Men.

Blow Holes or Slag Holes?

Editor American Machinist:

In reply to question 109 by I. C. G., Hackettstown, N. J., in your issue of November 10, for advice about blow holes in cast boilers for house heating, run on top with flat gates, I venture the guess that they are not blow holes, in the sense understood by molders, and that the wrong name steered the excellent editorial advice into the wrong channel.

They are, unmistakably, slag holes, and, if examined, in a cavity the size of a pea a piece of slag the size of a pin head will be found in a corner, it being the habit of real slag to throw off gas that forms a clean hole very much larger than itself, and more globular than a blow hole. The location of the holes around the flat gates points to slag; it, being very sticky, will adhere to the mold around the gates, instead of flowing as other dirt will. A flat gate also receives slag more readily than ordinary pouring gates, and they are not easily converted into skim gates. The question then is whittled down to the point, how to keep your ladle free from slag. If poured with newly lined ladles, and early in the heat, the castings would be found free from such blemishes. After a ladle has been used often, slag sticking below the lip will be liberated and flow at the bottom of the stream and cannot be skimmed with a rod. M.

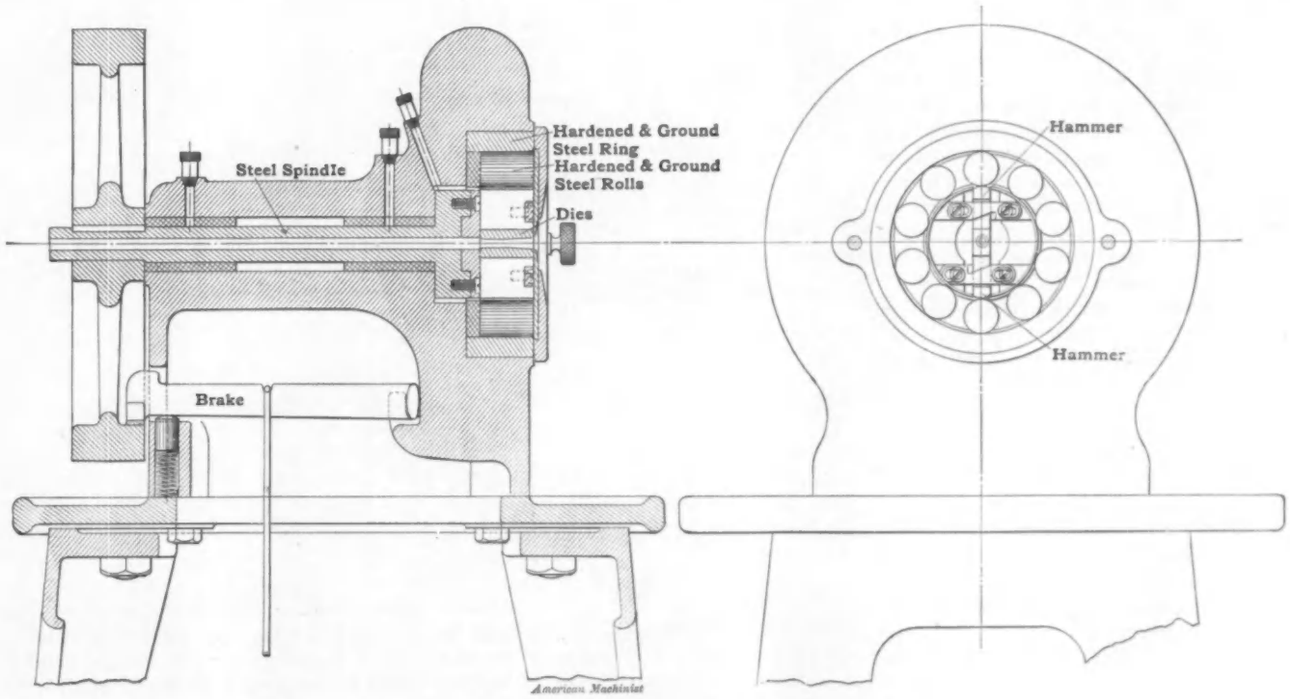


COLD SWAGING MACHINE.

The Reaping Machine at Kensington Museum.

Editor American Machinist:

Something like a year and a half ago you published a letter of mine from London in which I referred (among other things seen at the Kensington Museum) to the original Bell harvesting machine, basing my remarks on the cards posted on it, which said it was "the original reaping machine invented in 1826 by Dr. Bell," that "it had been used every year till 1867," and also upon my examination of the machine itself. I did not read, or else overlooked the fact that was printed in small type, which went on to say that the cutting apparatus was not a part of



SECTION OF COLD SWAGING MACHINE.

the original machine, but had been added later by Dr. Bell's brother, hence the information upon which I based my remarks was incomplete, and the remarks about that part of the machine, that is, the reciprocating knife, bar and open guards, were not justified. While I do not believe the cutting apparatus was ever copied from an American machine, if not invented until about the time applied, as is likely, it was anticipated by the American inventors.

These facts in the case have been pointed out to me by Henry J. Mann, of Pittsburg, who has been at considerable pains to collect information on the subject, and to whom I am greatly indebted, and I am glad to make the correction.

JOHN E. SWEET.

Counterbores for Screw Heads—Tit Drills.

Editor American Machinist:

In accordance with your request I send herewith a blue-print showing construction and dimensions of the counterbores we are making and using for filister, round and cheese-head screws.

We have tried many kinds of tools made for this purpose, both of our own and other people's invention, but invariably with the same result—they were not duplicated. Their chief unfitness was their expensiveness, not always in first cost, but in renewals—the cutting edges and shanks being made in one piece, which trouble in the present one is entirely obviated. The shanks are designed to take two sizes of cutters each, not with the view of changing them to meet the demands on the tool room, except in case of contingency, but in order to lessen their cost of production, a new cutter being inserted only when necessary to replace a worn out or broken one.

The second table represents what we are using in the nature of tit drills—explanation unnecessary, beyond stating that diameter B is slightly tapering—reasons obvious. They work like a breeze.

H. M. NORRIS.

Cincinnati, Ohio.

Marks on Drills and Reamers.

Editor American Machinist:

Being a common, everyday roustabout in a machine shop, I don't feel as though I possessed the proper qualifications to advance any new idea that would be of interest to the readers of the "American Machinist," but I would like to make a few remarks, in my own language, in connection with machine shop practice, which may develop some labor-saving results in the future.

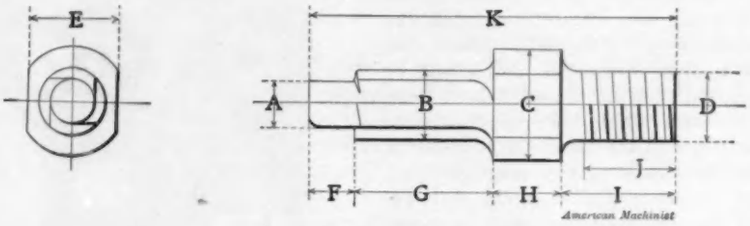
Some eighteen years ago I got a job in a machine shop in Minnesota running a drill press. After two hours of common labor I succeeded in locating the machine, which was mounted on a poor foundation in a dark corner. The cone pulleys on the countershaft put me in mind of a plurality of eccentrics, but being young, I thought all I had to do was to play ball. To my surprise I found that my path was beset with obstacles, trials and tribulations. Between myself, the drill press and the twist drills there was considerable of a wrestle for a few days, until we got organized and thoroughly familiar with each other, when one day a job was brought to me for perforation. It was one of those haste-makes-waste jobs, so of course I did not expatiate on the best way to proceed, but hastened to find the drill for this particular job. Being unable to find any size mark on the drill I asked John Jones if he knew where I would be able to find the drill. He immediately handed me a drill which he said was all right. Well, I succeeded in getting a hole through the piece and took it to the man who brought it to me, who went through the same motion in finding the size mark on a reamer, and finally had to resort to calipers. Upon entering the reamer he found that the hole had been drilled too large. I commenced to sweat in my boots, and thought my jig was up. He gave me Delaware, and, as usual, the foreman came around and gave me Dakota; Mr. John Jones caught Texas. The whole atmosphere was full of electricity for a few minutes, but as I had learned to count twenty, and being always able to maintain my equilibrium, I was not discharged.

Just then an idea struck me, and it seems as though I could not get another until I have made it public property.

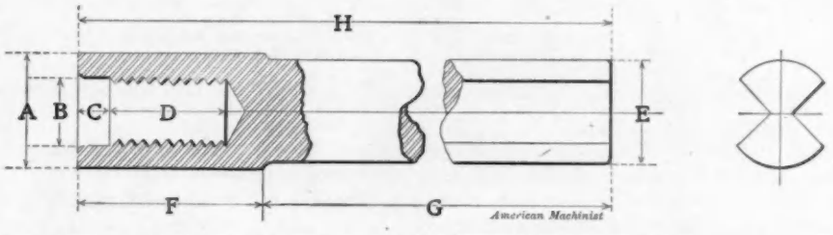
It seems to me that a more appropriate place for the size mark on a drill could be secured, as we all know that a drill not properly secured in the chuck has a great tendency to slip, which results in a demoralized shank, and nine times out of ten the size mark has vanished and leaves but one alternative, namely, the calipers.

If I should be allowed to make a suggestion, I would stamp the size mark in

STANDARD COUNTERBORES.



A	B	C	D	E	F	G	H	I	J	K
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	2
$\frac{5}{16}$	$\frac{29}{64}$	"	"	"	"	"	"	"	"	"
$\frac{3}{8}$	$\frac{17}{32}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$	1	$\frac{1}{2}$	$\frac{13}{16}$	$\frac{5}{8}$	$2\frac{1}{16}$
$\frac{7}{16}$	$\frac{39}{64}$	"	"	"	"	"	"	"	"	"
$\frac{1}{2}$	$\frac{11}{16}$	$1\frac{1}{8}$	$\frac{5}{8}$	1	$\frac{1}{2}$	$1\frac{1}{4}$	$\frac{5}{8}$	1	$\frac{3}{4}$	$3\frac{3}{8}$
$\frac{5}{8}$	$\frac{27}{32}$	"	"	"	"	"	"	"	"	"
$\frac{3}{4}$	1	$1\frac{3}{8}$	$\frac{3}{4}$	$1\frac{1}{4}$	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{16}$	$\frac{7}{8}$	$4\frac{1}{16}$
$\frac{7}{8}$	$1\frac{5}{32}$	"	"	"	"	"	"	"	"	"



DIAMETER.	A	B	C	D	E	F	G	H
$\frac{1}{4}$ TO $\frac{5}{16}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{16}$	$\frac{5}{8}$	$\frac{9}{16}$	1	3	4
$\frac{3}{8}$ " $\frac{7}{16}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{5}{8}$	$1\frac{1}{4}$	$3\frac{3}{4}$	5
$\frac{1}{2}$ " $\frac{5}{8}$	$1\frac{1}{8}$	$\frac{5}{8}$	$\frac{5}{16}$	$\frac{7}{8}$	$\frac{11}{16}$	$1\frac{1}{2}$	$4\frac{1}{2}$	6
$\frac{3}{4}$ " $\frac{7}{8}$	$1\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	1	$\frac{3}{4}$	$1\frac{3}{4}$	$5\frac{1}{4}$	7

the flute of drills and reamers near the shank, as it would remove a great deal of mental strain as well as minimize the liability of errors.

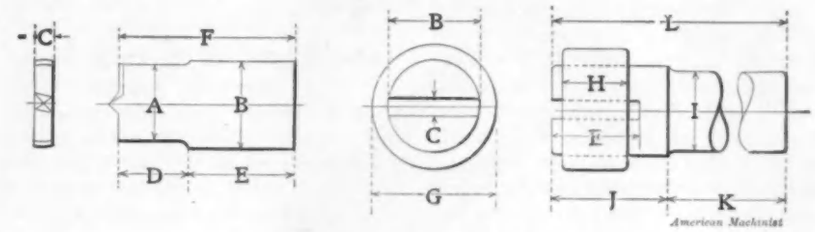
ODD.

Scales for Conventional Units.

Editor American Machinist:

For the benefit of the long-suffering tribe of draughtsmen and engineers, of which I am a member, I desire to call their attention to a means of readily laying off and approximating the sizes of machine parts as given by Reauleaux, Unwin, Low and others, where all sizes are referred to the unit, plus or minus a quantity. Thus $d + \frac{3}{8}$. Now if d happens to be 15-16, we have the unit 1.4375 to be enlarged 2.7, 3.37, 4.56 times, etc., which is enough to drive a man to drink. To avoid this, make a unit scale to the size the part is to be drawn, one-fourth or one-half full size, or any other, as here shown. The space to the left of the cipher is divided into tenths. Then when you multiply by, say, 2.7, lay from 2 to 7-10, and that distance is the size required without any calculation.

S. E. CLARKSON.



SCALE FOR CONVENTIONAL UNITS.

Why the Lathe Was Run Backwards.

Editor American Machinist:

In answer to the comment on my article appearing in the "American Machinist," January 12, I will say that the tool is back of the work for two reasons. The first is that on all lathes the tool-post can be run farther past the swivel-pin that way, and it is necessary to allow the tool to stick out of the tool-post a reasonable distance. The second is that the slide doesn't make such a long sweep, and consequently is not as likely to strike the dog or tail-stock. Of course the rest could be turned completely around, and the lathe run forward, but the tool point would still be between the tool-post and the cross-slide handle.

C. Z. D.

STANDARD TIT DRILLS.

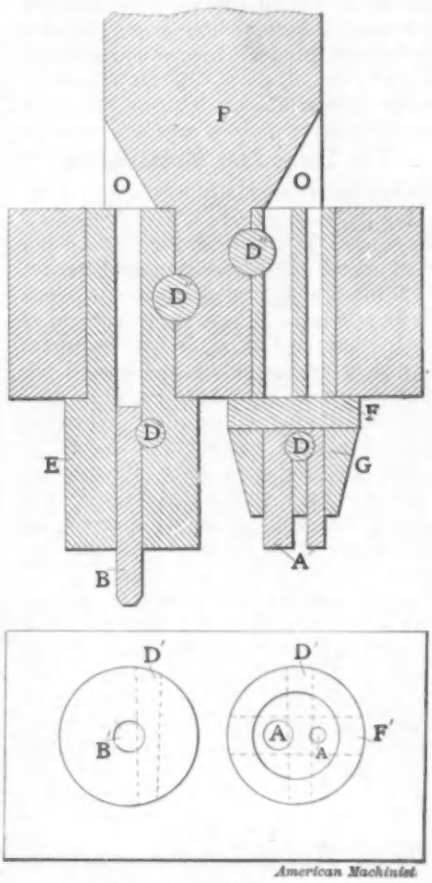
A	B	C	D	E	F	G	H	I	J	K	L
3/16	3/8	1/8	7/16	9/16	1	9/16	1/2	1/2	3/4	3 1/4	4
1/4	"	"	"	"	"	"	"	"	"	"	"
5/16	"	"	"	"	"	"	"	"	"	"	"
3/8	9/16	"	1/2	3/4	1 1/4	25/32	5/8	"	1	3 1/2	4
7/16	"	"	"	"	"	"	"	"	"	"	"
1/2	"	"	"	"	"	"	"	"	"	"	
9/16	3/4	3/16	9/16	15/16	1 1/2	1	3/4	5/8	1 1/4	3 3/4	5
5/8	"	"	"	"	"	"	"	"	"	"	"
11/16	"	"	"	"	"	"	"	"	"	"	"
3/4	15/16	"	5/8	1 1/8	1 3/4	1 7/32	7/8	"	1 1/2	4	5 1/2
13/16	"	"	"	"	"	"	"	"	"	"	"
7/8	"	"	"	"	"	"	"	"	"	"	"
15/16	1 1/8	1/4	11/16	1 5/16	2	1 7/16	1	3/4	1 3/4	4 1/4	6
1	"	"	"	"	"	"	"	"	"	"	"
1 1/16	"	"	"	"	"	"	"	"	"	"	"
1 1/8	1 5/16	"	3/4	1 1/2	2 1/4	1 23/32	1 1/8	"	2	4 1/2	6 1/2
1 3/16	"	"	"	"	"	"	"	"	"	"	"
1 1/4	"	"	"	"	"	"		"	"	"	"

Punch and Die Construction.

Editor American Machinist:

I agree with Mr. Painter in his method of constructing dies, and also in his practice of hardening them before making the punch, but in making the punch I do not approve of the proportions he uses. In Fig. 1 in his article of January 5 the punch would be much stiffer and less liable to spring if the punch plate B was double as thick. This would necessitate punch holder A being proportionately thinner, but there would be no danger of its springing, as it is backed up by the press.

In the group marked I the small punches are too long and slim; consequently they will spring enough to keep the die dull, no matter how well they line up.



ANOTHER COMBINATION PUNCH.

The holes in the punch plate B should be enlarged by counterboring to the size of the center punch hole, and the same size wire used, turning down the ends for three-sixteenths of an inch to the size required.

Mr. Painter's method of construction is largely used, but I prefer the style shown in the sketch. The article punched is a disk 11-16 dia. with a 3-16" hole in the center and a small hole at the side. The material is high-grade cast-steel .075 in. thick, and the small hole is .098 in. in diameter. I know that in a punch con-

structed like Mr. Painter's the small punch would not stand up on work of this kind.

Make the punch holder *P* to fit the press, drilling and reaming the holes for the blanking punch *E* and the sub-punch-holder *G*. Fasten them in place by taper pins *D*. Cut the opening *O* to allow *E* and *G* to be driven out. Place *E* in the die and transfer the holes for the leading punches *A* into the sub-punch *G*. Drill the holes through to allow the punches being driven out. Put in the backing pin *F*. Key the leading pin *B* and the punch *A* in place by the taper pins *D*. The punches *A* are made of drill rod, and must be hardened the whole length, otherwise they would upset by the heavy work so that they could not be driven out. When, from use, the punches *A* become too short, remove them and grind *G* down one-eighth of an inch.

C. H. WILCOX.

Springfield, Mass.

The Paint Not Remarkable.

Editor American Machinist:

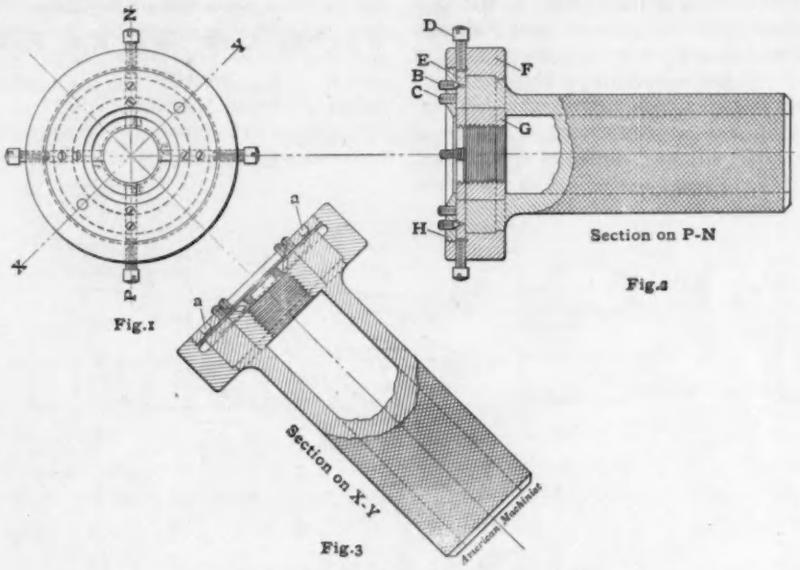
On pages 27-31 of the last "American Machinist" reference is made to an old sign where the letters remained perfect and the wood around them was worn down 1-16 inch. I have seen a number of such signs, and there is nothing about the paint but lampblack and linseed oil. The signs were always painted white first, and the lettering put on after. When the subject was up before the A. S. M. E. about painting iron work, the various facts reported and stated pointed out clearly that nothing else is as good—an old bridge up in Vermont with the iron work painted black had stood for one hundred years. The tie rods at the springing of the arches in the ducal palace at Venice, put in when the building was built, in the thirteenth or fourteenth century, have not yet completely rusted away, and they are simply painted black, just the most common of black—lampblack and oil.

JOHN E. SWEET.

Die for Threads with Accurate Lead.

Editor American Machinist:

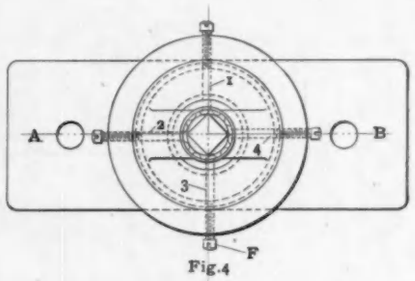
I send you drawings of a sizing die for sizing threads and also drawing of a fixture for making cutters for the same. I am working in a shop where they are doing work for the Government, and, as you know, such work is held right to gage and every piece is inspected. The job I speak of is making the fuse that goes in the shell, and as we are only allowed two one-thousandths of an inch on the thread part of the fuse, we have experienced a great deal of trouble in making sizing dies. We tried all kinds of steel and treated it in various ways, so as to hold the lead correct in hardening, but still we failed to do so. Well, after making nine dies, one right after another, and only getting one good one to cut to gage, I got discouraged, and thought it was time to try something else instead of split-dies. I made two dies like the drawing enclosed that did away with all the trouble, and they are a grand success. They not only cut a perfect thread, but they also do more work.

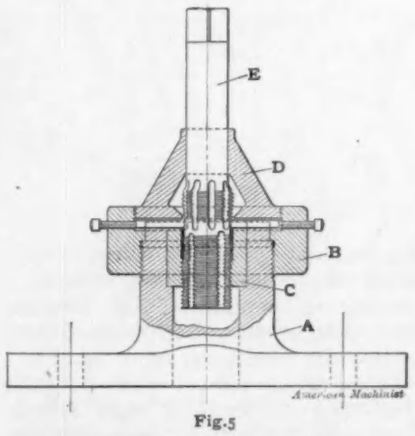


DIE FOR CUTTING SCREWS OF ACCURATE LEAD.

The die is made so that it can be held easy by hand. To start with, we have one gage 0.722", which must go right up to the shoulder, and one 0.720" not to go on. This die is used on brass, but can be used on iron or steel as well. Fig. 1 is an end view of the die, Fig. 2 a section on *P N*, and Fig. 3 a section on *X Y*. *G* is a tool steel bushing cut in the lathe and fitted into the holder. It is left soft to keep the lead of the thread perfect. In the bushing there are four cuts made, as shown in Fig. 1, numbering 1, 2, 3 and 4, to receive the cutters. *E F* is a collar fitted over the holder. *H* is a ring screwed into collar *F*, and in this ring *H* are tapped screws *C* and *B*, four of each. The screw *C* holds the cutters down on the bushing *G*, and screws *D* and *B* are for adjusting the cutters *E*. *A A* are spanner holes. If I am going to size a thread, say ten to the inch, I make my cutters so that I get two cutting points on each cutter. Of course the cutters can be made deeper, but the idea is to have the work get in the bushing, for I depend on the bushing to perfect the lead. The cutters are the only parts that are hardened on the die, and what they change in hardening will be very small. It is a good plan to cut the bushing *G* about .002" larger than the work you are going to size, to be sure that the work will not bind in the bushing.

To explain the fixture for making the dies: Fig. 4 is a top view, *F* being screws to hold the cutters from backing when the hob *E* is cutting, and Fig. 5 is a section on *A B*. *A* is the base made of soft steel and *B* is a collar screwed on base *A* to receive screws *F*. *C* is a tool steel bushing cut in the lathe and must have the same lead as bushing *G* in the die, Fig. 2. Bushing *C* is fitted in base *A* and held by screws, so that it will not turn. *D* has an annular base which holds the cutters down on bushing *C*. *D* also forms a guide for the shank of the hob *E*. The space between the guiding thread and the cutting thread on the hob is turned to the bottom diameter of the thread, and it serves as a gage to set the cutters up to. The bottom part of the hob is left soft and has four grooves cut in it, so that if any chips get in the bushing *C* it will have a tend-





FIXTURE FOR TAPPING THE DIES.

ency to clean them out. It is necessary to have as many grooves in the upper part of the hob as possible, as it will cut better and will not tear the cutters. The upper part of the hob, which does the cutting, is hardened.

In the drawing of the fixture, Fig. 4, the cutters are set 1-32″ ahead of the center cross line, while in the die, Fig. 1, they are right on the center. This gives the cutters a proper clearance, or, in other words they are backed off so that they will not cut when the die is run back on the work. Please notice that it will be necessary to number the cutters so that there will be no mistake in placing them in the die.

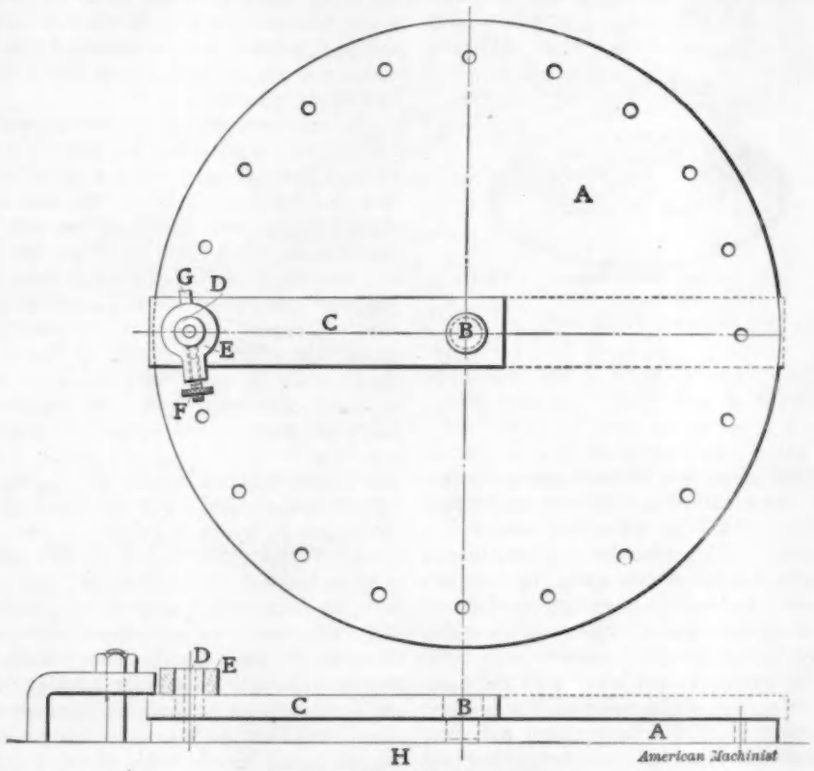
HERMAN J. HILGENDORF.

Derby, Conn.

An Improvised Spacing Device.

Editor American Machinist:

The accompanying sketch shows a spacing device which has recently been used to good advantage for dividing and drilling a number of holes in a circle. It is a simple appliance, and may be of help to some readers of the "American Machinist" who do not possess a dividing machine. Referring to the sketch, *C* is a straight piece of bar machinery steel, of sufficient thickness to get a proper bearing for hardened bush *D*, the bore of which is made to receive the drill to be used. Bar *C* is drilled from the required radius to receive pin *B*, which is turned to fit into plate *A*.



AN IMPROVISED SPACING DEVICE.

A sharp scriber fitting the hole in bush *D* is now used to mark off the circle of holes. The preliminary spacing is done in the usual way, with dividers, in order to secure the approximate distance from center to center of holes. Bar *C* is then clamped as shown in elevation. The first hole is drilled; a snug-fitting plug is then inserted into the hole, and the outer end of adjusting screw *F* is set against the plug and adjusted until the hole in bush *D* corresponds with the next division. The bar *C* is again clamped and the second hole is drilled. The plug is then placed in the second hole, and the former operations are repeated until the entire circle is drilled.

It will be readily seen that the distance between all holes will be alike, except the first and last hole. These may or may not be alike, as all depends, of course, on the first setting. Supposing that the distance then taken with a micrometer should be 1-16″ greater or less than the other holes; this would show that the spacing had gained or lost 1-20 of 1-16″, or about .0031, on each hole. The distance is then taken with a micrometer caliper from the end of adjusting screw *F* to the measuring point *G*. The adjusting screw is set in or out the required amount, as the spacing indicates. Bush *D* is then pressed out and a larger bush inserted. This bush should be hardened, the hole lapped, and the bush ground on the outside.

A rose reamer is used for the second operation, and the holes are reamed as they were drilled. The first reaming may not be as close as desired, because of the reamer having more to cut on the side of each succeeding hole. The distance may be taken as before and a third bush inserted and the holes reamed a second time, as this insures the best results. It will be noticed that screw *F* is fitted into swiveling block *E*, which fits snugly to bush *D*. It is obviously necessary that the measuring points should swivel, in order to keep the measuring screw in line with the chord of the arc. The block *E* must of course be swiveled to suit the number of holes to be drilled. The device shown is only intended for drilling for a given circle, but, if need be, bar *C* may be slotted and plug *B* squared to fit the slot and adjusted for any reasonable size circle and clamped by nut and washer. To use this device for a given number of holes I would suggest that the adjusting screw be tapped into the side of the bar, as near the bottom as possible, and that the bar be made wide enough to give a broad bearing on the plate. The device is applicable to plates of large diameter and may be used on an ordinary drill press.

C. O. SCHELLENBACH.

Rule for Figuring the Size of Blank for Drawing Shells from Sheet Metal.

Editor American Machinist:

Noting your reply to Mr. H. K. G., Watertown, N. Y. (question No. 106, November 10 issue), I should like to state another simple rule, which I very often use, for figuring the size of the blank for drawing shells, seamless ferrules, etc., out of sheet metal. First take the sample shell and measure its outside diameter, then add to that the depth or length of the shell, and then allow 1-32 of an inch for every 3-16 inch in length. This allowance is for trimming or "edging," as it is almost impossible to draw a shell perfectly square across the top to the required length of the sample; therefore we make this extra allowance for edging. To make this rule a little clearer, take a simple example. For instance, suppose we have a sample shell; its outside diameter is .950 and its depth or length is 21-32, or .656, and then, according to our rule, we allow 1-32 of an inch for every 3-16 inch in length, which equals .109. Therefore we have the following:

Diameter of shell = .950″
Length of shell = .656″
Allowance for edging = .109″,

and .950 + .656 + .109 equals 1.715, which is the diameter of blank. Probably it would be well to suggest that this rule applies only where the shells are cut and drawn in one operation, or, in other words, on a double-acting crank or cam press, the latter style being preferable, as it runs more smoothly and rapidly. Sometimes (very rarely, I hope) shells are made in two distinct operations. By that I mean that they are first "cut" in

blanking die, and afterwards "drawn" through what is sometimes called a "push through" die. Of course this method is used only in a shop where they have only single-acting crank presses, and, unfortunately, I never happened to be a toolmaker in a shop where this method was tried, so I do not know what success one would have in drawing shells that way. I have seen double-acting automatic cam presses speeded up to the rate of 125 strokes a minute, and the results were very satisfactory indeed.

C. C. CANDRIAN.

Springfield, Mass.

Providing Vent for Cores by Both Coremakers and Molders.

Editor American Machinist:

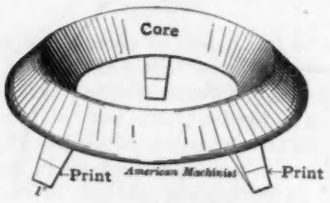
The good coremaker when making cores, particularly those that are nearly or quite surrounded with metal, gives thought to the materials to make the cores of and how they shall be mixed to secure porosity or openness. Such cores as port cores for steam cylinders, water jacket cores, cylinder cores, air-chamber cores for pumps, etc., are here referred to, there being as a rule small prints and few outlets permissible for such cores. There is always some moisture in a core, even if apparently dry and hot, right from the oven. If there is much moisture in the atmosphere, the cores absorb more or less of it, and continue to do so up to the time when the metal reaches them. Cores made of sea sand, so-called from being obtained on the sea beaches, is very absorptive of moisture, considerable salt being present. It is plain to see that large, generous provision should be made in the cores to let off the steam and gases that will be generated very quickly when pouring takes place. A good, liberal quantity of cinders or ashes, or both, put in the body of the core, when possible, is the best practice, as it makes the core open and will come out of the casting easy. Care of course should be taken not to put in cinders larger than the outlets at the core prints.

It is amusing to note the whims and delusions that take possession of core makers and molders, who seem otherwise to be very intelligent, as to how to make difficult and intricate work, both as to cores and molds.

A core maker was told to put cinders in a core. "That won't do, boss, sure; there will be trouble if you try it." "Why? What can happen? Let us know. I have used cinders in cores in the past, and I never found anything wrong about it." "Well, sir, there do be moisture in them yere cinders, and it's moisture ye's want to keep out." "Yes, that is why we bake the cores. You go ahead, and if any failure comes from cinders, or other directions of mine, just you lay it on to me."

The molder is sometimes thoughtless; it cannot be called carelessness, as he sometimes goes through more motions and exertion to half do a thing than to do the thing needed in a most thorough manner twice over.

How often the vent to quite a fair-sized core will be made with a ⅛-inch wire when to push a ⅜-inch one down or through the core print does not require more time or much more exertion. Then, again, he will make a scratch on the joint for exit of vent, then brush the joint off and fill the scratch with sand, then clamp up the mold and squeeze the vent outlet until the area of space left is nearly nil. When the piece is poured it will throb and pulsate. Then come the heroic measures of kicking the flask, touching up the gates, putting some metal right down the riser, and the general deliberating as to the cause of the kicking of the hot metal, and the molder sweats from anxiety as well as from heat. The next morning or some date in the immediate future, the foundry foreman, foreman of machinists, consulting engineer or designer, will hold a consultation as to the fitness of this imperfect casting for the purpose intended, and, after turning it over and over, physically and mentally, it is decided to be unfit.



A BAD CORE TO VENT.

All of this in many cases would be avoided if vent, vent, vent was generously given to the core.

There was a piece given a molder of which there were to be a number made. It had a core much like the cores that form the web in chilled car wheels (see sketch). This core was surrounded by metal, except the small portion of the prints shown by dotted lines. These prints were about 1 inch in diameter had ⅜-inch wire for vents in each print that connected with cinders in the body of the core. The foreman did not get around to this man until he had four molded. The last one of this four the molder was then venting or providing for the exit of the vent from the core, by putting a ⅛-inch wire into each print and connecting with a flat thin lifter pushed in between wooden bottom board and nowel. (I wish to remark in this connection that of all the uncertain, hope-deferring methods to let off vents this certainly is the one way most pernicious.) Then ensued the following conversation: "Do you think the vent will come off free enough with the provision you have made for it?" "Well, sir, that is the way they has all been made that I have seen. 'E hain't no pudding to save, 'e hain't. Why, boss, they never saves mor'n 'aff of um." "What happens to them?" "Why, 'e blows from that ere core, comes shelly around the 'ub and rim, cope side. You doesn't make the cores hopen enough; that's what I says." "Well, you and I will make one or two, and if they don't turn out as well as those previously made, you lay it on to me." "All right, sir; I's halways willing to larn." "In the first place, mark the follow board and the pattern, so the pattern can be placed in the same place in all the flasks; then have the carpenter bore three-quarter-inch holes opposite the prints in each board, and have him put in some half-inch dowels in each print; then ram up some markers or bits of iron with half-inch holes to fit over the dowels in the prints, to prevent washers wearing away from the true position while the nowels are being rammed up, then, when pattern is drawn, shove a half-inch or a three-eighths-inch rod right down each print, putting some paste around the ends of prints when you set the cores. Now when you clamp up your molds, you will not shut up the outlet for the vent, and that is quite sure to happen when you use a thin slicker; don't do that again, please."

The next morning, when the foreman passed, this molder leaned over on his rammer, gangwayward, with a make-myself-solid smile: "Mr. P—, the first of them I put up came shelly, as they uset." "How were the others?" "Well, sir, I am blessed if Hi hain't afeared hevery bloomin' one of um is a shiner (good one). I never thought there was so much vent in air. 'E blazed up that hi' from under the flask." "Those seem to be better cores, don't they? It improves cores wonderfully to provide for good, free vent."

L. C. JEWETT.

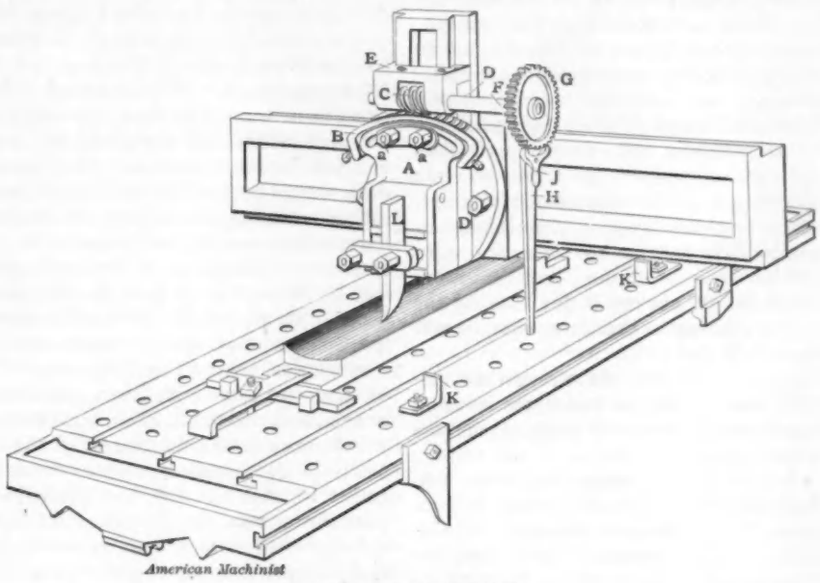
Planing Concave Surfaces.

Editor American Machinist:

It is sometimes necessary to produce accurately machined concave surfaces of considerable length and of fixed radius. In the columns of the "American Machinist" have been described and illustrated, from time to time, ingenious devices for the purpose. It is probable that there are many others equally good that have not been so described, and it is quite possible that the device here shown may have been known, used and described before. But as one generation of mechanics follows another, some of these good things are lost sight of and perhaps forgotten by the older workmen, and it is not, therefore, amiss to call attention to such devices, even though they are not patentable for novelty.

The arrangement here illustrated was designed as a simple method of planing a curved surface in a large number of

pieces of about the form and proportion shown in the drawing, although it is easily adjustable for quite a wide difference of radius. The construction is as follows: To the clapper box *A* is attached a worm-segment *B* by means of the two set-screws *b b*. Fixed to the slide *D* is the block *E*, in which is journalled the short shaft *F*, upon which is fixed the worm *C*, which engages the worm-segment *B*. Upon the outer end of the shaft *F* is the ratchet-gear *G* (in this case a change gear from a lathe). Pivoted on the shaft *F*, just inside the ratchet gear *G*, is the feed-lever *H*, carrying the reversible pawl *J*. The lever *H* is long enough to clear the planer table about an inch, and is actuated by the two dogs *K K* secured to the planer table at proper points to operate the feed while the tool is not cutting. The point of the tool *L* is adjusted at a proper distance below the center on which the clapper box rotates to give the required radius to the work. The nuts *a a*, holding the clapper box in position, are set up just tight enough to prevent the chattering of the tool, and still to allow the worm to feed.



PLANING CURVED SURFACES.

Many hundreds of pieces have been successfully planed by the use of this device and no trouble experienced in its use. It is simple and inexpensive to construct, readily attached and detached, and capable of adjustment to a sufficient extent to make it, what experience has shown it to be, a very useful device to have around the planer.

OSCAR E. PERRIGO.

New Haven, Conn.

The Soot Stopped the Draft.

Editor American Machinist:

The following incident may be of interest to some of your readers: The "management" decided to heat several shops with steam. A building was erected and two second-hand locomotive boilers were installed. One stack, 20 inches diameter and 34 feet high, did service for both. The fuel used was old car material, Georgia pine chiefly. For safety, a spark arrester of wire netting was put in the top of the stack. Everything went lovely for the first three days, and then they could no longer make steam. The trouble was found in the netting being choked with an oily soot carried there in the smoke. After removing the netting the boilers steamed all right.

WM. NEWTON.

Artificial vs. Natural Draft—Cost of Electric Lighting.

Editor American Machinist:

Here are a couple of queries: If fan draught for steam plants is far superior to that of a chimney, as various writers say, why does the traction company of New York City erect the big chimney?

The Hartford "Times," in a recent number, had an editorial on the cost of electric light and power in English cities. The figures quoted were from the annual reports of the electric companies to their city governments. The figures show the cost of a 5 ampere arc light to be $0.02 per hour, or about $0.24 per night of twelve hours on our street lights. Now are the English companies so much better equipped and managed than ours or are our companies making 100 per cent. profit on their city contracts?

H. W. K.

A Progressive Machine Shop's Treatment of Technical Papers.

A machinery building establishment which within the past few years has been rejuvenated and has taken a new lease of life, with resulting increase of business and improvement of general reputation, has among its other modern improvements a modern and progressive superintendent who believes in doing things in modern ways and in taking advantage of every improvement in design of product and in method of production.

His treatment of the question of technical periodicals, for instance, is an illustration of what we consider the broad gage plan upon which this plant is now run. His practice in this regard is based, as he expresses it, on the belief that his men should, so far as possible to induce them to do so, subscribe for and read the best technical paper that relates to shop practice. He says he believes that the better his men are acquainted with general shop practice, and with what is going on in other establishments, the easier it is for him to introduce improved methods of doing work in his own place, the men being more ready to adopt and to enthusiastically make use of improved methods if they know that they are only doing what is being done to a greater or less extent in other establishments that are progressing. At the same time this superintendent realizes that $3 is to some of the men a considerable sum to pay out for shop literature, and he therefore arranges with a newsdealer to deliver the "American Machinist" every Friday morning at the office of the works for those employed therein who subscribe for it. Once a month this newsman enters the shop for the purpose of making his collections, and the men thus pay by the month instead of in a lump sum, which comes more easy for them and results in a considerably larger list of subscribers than would otherwise be obtained in that establishment.

Our superintendent is satisfied that the paper exerts a good influence. He says it stimulates the men and gives them ambition to emulate the example of others who are progressive in the business. He realizes that many of them, by reason of this ambition and improvement, will have to be paid more wages after a time than would otherwise be the case, but he says that if they do it will be because they are worth it, and he will be glad to pay it, and believes that he will receive full value for the increased outlay. This method of handling this matter is in rather sharp contrast to the plan pursued in a few other establishments where the action is such as to lead anyone to infer that the "American Machinist" would be a deterrent and reactionary influence rather than otherwise, and one not to be encouraged among the men. We are glad to say that there are not many of the latter kind of establishments, but some of them do exist. We believe the liberal, broad-minded attitude is the one that will pay best in the end. Machine construction is an art requiring for its best and most efficient prosecution intelligent men—men who should know as much as possible of what others are doing in the same and similar lines of work.

The Fourth Annual Convention of the National Association of Manufacturers.

The annual meeting of this association convened January 24, at 10:30 A. M., in the Odd Fellows' Hall of Cincinnati. The hall, which is admirably adapted to such purposes, was profusely decorated with flags and bunting, a striking feature of the decorations being the use of the State shields which were used in the convention hall in which Lincoln was nominated for the Presidency.

The convention was called to order by Thos. P. Egan, who introduced Governor Bushnell, of Ohio, himself a prominent manufacturer. Governor Bushnell, in a few very apt and well-chosen remarks, welcomed the members to the State of Ohio, and was followed by the Hon. Gustave Tafel, Mayor of Cincinnati, who performed the same office for the city. Following these speeches came the reply of President Search, of the Association. Following these formal matters came an act which was not on the program—the presentation to the society by Mr. McDougal of a handsome gavel made from wood which had been obtained from Cuba, Puerto Rico, the Philippines and the United States. In the course of the remarks accompanying this presentation the surprising statement was made that the foreign trade of Cincinnati had grown from a total of $1,000,000 in 1895 to $6,000,000 in 1898—a growth larger, it is believed, than can be shown in any other city or locality.

Following the acceptance of this gavel by the president came the annual report of the president. This report occupies thirty-four closely printed pages and cannot be given even in abstract here. Those who wish to obtain a comprehensive idea of the vast field of activity of the Association and of the great work it is doing, should obtain a copy. A bare outline of the topics discussed must here suffice. After a reference to the results of the war with Spain, and to the phenomenal recent growth of the exports of American manufactured goods, the report discussed the field of legislative work before the association, under which head were taken up the subjects of the multifarious State laws affecting interstate commerce, and the advisability of having an official representative in Washington to voice the desires of the Association in such matters as the Nicaragua Canal, the merchant marine, the proposed new department of commerce and industries and the transportation interests of the country. The shipping problem, the Nicaragua Canal, a national bankruptcy law, the department of commerce and industries, the Paris Exhibition of 1900, the parcels post to foreign countries, the consular service, patents and trade marks, and international freight and transportation, the Caracas warehouse and other warehouse projects, the Burea of Information, the subject of dealing with delinquent foreign debtors, the publications of the Association, technical and commercial education and the suggested enlargement of the basis of membership, were all treated in the lucid manner which has come to be expected of President Search, and much information regarding the workings of the Association was given.

The high esteeem in which the Caracas warehouse is regarded by the Venezuelan people was set forth at length, and the statement was made that, although opened but ten months ago, the warehouse, but for the effect of the war with Spain, would already be on a self-sustaining basis. Exports to Venezuela have, however, increased 60 per cent. in a year—a large part of which increase is credited to the influence of the warehouse.

One of the practical outcomes of the Association's work has been the establishment in New York of a Bureau for attending to foreign shipments for the members, and another is the publication of a "Bulletin," which is issued in confidence to the members and contains particulars of inquiries received from time to time regarding inquirers from abroad for goods which members may supply. These inquiries have become so numerous as to call for an issue of the "Bulletin" every fortnight. A change in the date of the annual meeting to the spring months was also advocated.

At the conclusion of the report a standing vote of thanks and three rousing cheers were given to the president and the management.

Following the report came the announcement of the membership of committees on Credentials, Rules and Order, Resolutions, Nominations and Constitution, as well as the Auditing Committees.

TUESDAY AFTERNOON SESSION.

This session was devoted to the presentation of reports of committees. That on Transportation reported that in view of the unsettled state of public opinion no action by the present Congress regarding amendments to the interstate commerce law was to be expected. The committee recommend that the association reaffirm its position regarding the amendment of interstate commerce law to give vitality to the findings of the Interstate Commerce Commission, absolute publicity of votes being required and severe penalties imposed for infraction of the law. It was also recommended that common carriers be permitted to enter into legally responsible contracts to maintain rates, these rates being, however, subject to the control and supervision of the Interstate Commerce Commission.

The Committee on International Freight and Transportation explained their work in endeavoring to secure modifications of existing forms of bills of lading. Through its Bureau, already referred to, it has been able to make some very advantageous arrangements with certain steamship lines. Contracts have been made with forwarding agents in foreign ports whereby the cost of forwarding goods to interior cities has been materially reduced—in some cases to about one-half the usual rates. By reason of these contracts the committee can now inform shippers of the exact cost of transportation to nearly every port throughout the world and to nearly all the principal cities of Europe.

The Committee on Language, Weights and Measures recommends that after Jan. 1, 1900, all government business, except the completion of the government survey, be done by the metric system.

WEDNESDAY MORNING SESSION.

After the presentation and adoption of the report of the Committee on Rules and Order, the convention proceeded to the discussion of the President's report, the subjects taken up being Legislative Work, Extension of American Shipping, and the Nicaragua Canal. Under these heads resolutions were offered and passed that the work of the Association for the coming year, without neglecting the foreign field, should be directed more to the conditions affecting domestic trade; endorsing the bills now before Congress for the extension of American merchant shipping, and for the construction of the Nicaragua Canal. In the midst of this discussion the Committee on Resolutions brought in a resolution urging the Senate to ratify the treaty of peace with Spain, which was unanimously adopted after a discussion which was the best illustration of the capacity of the American people to get together which it has ever been the writer's good fortune to see. At the start sharp differences of opinion were prevalent, and many feared that the resolution might do much mischief by creating a breach, but under discussion on the give-and-take plan, differences were explained away, misunderstandings were corrected, and after the motion had been adopted, the motion to make the vote unanimous was made by the gentleman who had offered and warmly supported a substitute resolution, and was seconded by another of the leading objectors to the resolution as originally proposed, until what threatened at the start to become a storm center ended by being not much short of a love feast.

WEDNESDAY AFTERNOON SESSION.

The consideration of the President's report was continued, several sections being, however, passed over because the Committee on Resolutions had not been able to draw up the appropriate resolutions. The subject of the Parcels Post was discussed at length, the great inferiority of the American postal service in that particular being brought out very forcibly. Mr. Dolge, the representative of the Association in Caracas, Venezuela, was present, and made the surprising statement

that there were no adequate postal facilities for sending catalogs and similar literature to Venezuela, much to the disadvantage of American manufacturers. It was also brought out that the Chamber of Commerce and other commercial bodies of Detroit, Mich., had thoroughly investigated this question and published a pamphlet in which parcels postage rates in this and other countries were compared and radical changes in our present regulations recommended. After full explanation of the Detroit movement a motion endorsing it was passed.

Under the head of the Caracas Warehouse, votes of thanks for their co-operation were extended to the President of Venezuela, the Chamber of Commerce of Caracas and the United States Minister at Venezuela. It should have been stated, when referring to this warehouse in the report of Tuesday's proceedings, that the deficiency due to its operations for the first year was but $1,377.93.

Under the head of Other Warehouses Mr. Shizua Kondo, President of the Japan-American Commercial and Industrial Association of Tokyo, Japan, was invited to address the convention from the platform, which he did, to the great pleasure of all. He dwelt on the importance of the Nicaragua Canal as an element in the control of the commerce of the Pacific of this country, and stated that the exports from the United States to Japan had increased 65 per cent. during 1897, the increase from all other nations being but 28 per cent. Under these circumstances Mr. Kondo could not understand, and his people could not understand, why so small a share of the American trade should be carried in American bottoms. He also called attention to the Imperial Commercial Museum in Tokyo, which is open to all, and on exhibits in which no duties are charged. The address was quite lengthy and closed with the assertion that the time had come for the United States to outdo all rivals in Asiatic trade. It was listened to with marked attention and was awarded a well-deserved vote of thanks.

The subjects of a Branch Office in New York and the establishment of additional warehouses in Mexico and Hamburg were then discussed at considerable length, but were eventually referred to the Executive Committee.

THURSDAY MORNING SESSION.

The chief business at this session was the delivery of an address on the Paris Exposition of 1900, by United States Commissioner General Peck. The address had been carefully prepared, and was read from manuscript. The success of Mr. Peck's efforts to secure an increased allotment of space was explained, together with the need of an increased Congressional appropriation. Referring to doubts about the exposition being held in 1900, which had become current, Mr. Peck stated that there was no room for doubt about it, the preparations being in a greater state of forwardness than in the case of the Chicago Exposition at a corresponding period. At the conclusion of the address Mr. Peck was unanimously elected an honorary member of the Association, and a resolution calling for an increased appropriation was passed, the Executive Committee being made a special committee to appear before the proper Senate and House committees in Washington and voice the wishes of the Association.

THURSDAY AFTERNOON SESSION.

The session opened with the submission of resolutions by the Committee on Resolutions, which were approved. These resolutions endorsed the bill now before Congress for the reorganization of the Consular service; endorsed the Export Exhibition to be held in Philadelphia next fall; endorsed the International Exposition to be held in Venezuela in 1900; protested against the proposed increase of the minimum carload from 20,000 to 30,000 pounds, and urged Congress to provide for deepening seacoast harbors. The Committee on Language, Weights and Measures was discharged on its own request, as it had been unable to agree upon any measure.

A slight change in the constitution was recommended by the Committee on Constitution, and was adopted. The change alters the composition of the Executive Committee and increases the number of members at large from three to six.

After a spirited discussion, Boston was decided upon as the place of the next convention, the date being left to the Executive Committee, but with the recommendation that it be later in the season than has been the practice.

The convention then elected officers for the ensuing year, the retiring President, Secretary and Treasurer being re-elected with great enthusiasm. The usual votes of thanks were then passed and the meeting adjourned.

Thus closed the formal proceedings of the best and most profitable meeting the Association has held. It is the general feeling that the practical tangible results accomplished during the past year will lead to a large growth in the membership in the near future. At present the Association has 834 members in good standing, an increase of 190 during the past year.

This report should not close without reference to the unofficial proceedings—the vaudeville smoker with its side-splitting native cake-walk of Tuesday evening; the lectures of Engineer L. M. Haupt and Mr. Sanborn, the President's assistant, of Wednesday evening, and the reception of Thursday evening. Mr. Haupt's lecture on the Nicaragua Canal deserves wide distribution. He was a member of the Canal Commission, spoke by authority, and his words could not fail to give an impetus to the Canal movement could they be widely distributed. Mr. Sanborn's lecture showed the quarters and explained the workings of the Association. Both lectures were profusely illustrated by lantern pictures, and were listened to with marked attention.

Technical Publications.

A new publication which reaches our desk is called "The Engineering Times." It is edited by Mr. Ben. H. Morgan and published in London. It is in magazine form, and contains articles of general interest, more especially those which relate to mechanical engineering. In it there is the first installment of a series of articles on machine tools, in which the author draws some comparisons between American and English practice, mechanical and commercial.

Apparently one of the most serious problems connected with the development of horseless vehicles seems to be to get an English name for them that it will be possible to remember and to pronounce, and at the same time satisfactory to the word-carpenters, yclept philologists. Each name that is tried on them seems to produce a rather more alarming effect than the last one, and the latest, "autotruck," is evidently regarded with feelings of deepest horror. We commend to these language scientists a name said to have been invented, authorized and promulgated by the Flemish Academy at Antwerp. It is Snellpaardelooszonderspoorwegpetroolrijnig.

We have a communication from Mr. David Gaehr, Physical Director of the Y. M. C. A., Ithaca, N. Y., in which he says that about $20 worth of machinists' tools, among which are squares, calipers, micrometer, scales and a hammer, has been stolen from him and that they are marked "D. Gaehr." Anyone seeing these tools will confer a favor by communicating with Mr. Gaehr or with the police of Ithaca.

At the recent meeting of the American Society of Heating and Ventilating Engineers held in this city, the following officers were elected: President, Henry Adams, Washington; Vice-Presidents, D. M. Quay, of Chicago; A. E. Kenrich, of Brookline, Mass., and F. A. Williams, of New York; Secretary, W. M. Mackay, New York; Treasurer, Judson A. Goodrich, Philadelphia.

"The latest announcement is that Mr. Leiter, of Chicago, who tried a corner in wheat last summer, is coming to this country to exploit a new 'air motor,' which is to revolutionize transport in cities. Mr. Keely, of 'Keely motor' fame, being dead, it is pleasant to find that someone will take his place and do something to impart a little excitement to the world of mechanics."—*The Engineer*, London.

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Name and address must always be given, though not necessarily published.

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The Revelations of Electric Power Tests.

Perhaps one of the most astonishing signs of the times is to be found in the fact that so eminent an authority as "Engineering," of London, has the temerity to speak disparagingly of the steam engine indicator and of the nearly perfect indicator diagrams which we have been so taught to admire. It alludes to the fact that steam consumption has been stated in terms of the indicated horse-power rather than the brake horse-power, but that this has, after all, been done on account of the difficulty, or, rather, the impossibility of determining the brake horse-power or the power actually realized from so many of our large engines, especially marine engines and large mill engines. A standard of efficiency must necessarily be false which ignores the efficiency or the inefficiency of the engine mechanism. The perfect corners and the correct curves of many admired indicator diagrams have given false evidence, or have given no evidence as to the ultimate efficiency. The electric generator has lately arisen, and has proved to tell most accurately of the power imparted to it, and has won confidence at once by its revelations as to engine efficiencies. One of its first achievements in this line has been to supplement the incompleteness of the indicator diagram, and to show that some of the niceties and perfections of the so-called best diagrams have cost more than they were worth, and higher efficiencies have been revealed by the generator with less perfect and admirable indicator diagrams. The contractor has been driven away from his old standard of coal consumption per indicated horse power at the cylinder, with no thought of anything beyond that, and has been compelled to show definite units of electrical energy actually delivered for units of coal consumed. This at once has shown the loss of power in rope or belt drives, and has led to the direct coupled dynamo, a direct gain of at least 6 per cent. So it has been shown by the same means that average pressures, referred to the low-pressure cylinder, must be considerably raised to get increased economy. The question of vertical versus horizontal engines also finds the necessary evidence for its settlement in the testimony of the dynamo. Mr. Ziese, of St. Petersburg, holds that waste of power from internal friction and steam losses can only be reduced to a minimum when pistons, slides and rods move vertically, and when the cylinders of compound and multiple expansion engines are so near each other as to have the shortest possible passages between them. The horizontal engines have defeated the conditions. Heavy fly-wheels, which were a necessity of the horizontal construction, have not only widely separated the cylinders, but have necessitated also abnormally large shafts with necessarily increased friction, besides the friction due to the weight of the horizontally reciprocating parts. High speeds have also been shown to be an element of high efficiency, and these also have only been attained by the vertical engine. Combined dynamos and vertical engines, it is said, have given mechanical efficiencies of 90 and 92 per cent., while with the best type of horizontal engines the efficiency does not exceed 85 per cent. The vertical engine also maintains its efficiency for years, while the horizontal engine wears and becomes less efficient. We are as far as ever from being able to measure the brake efficiency of rolling mill engines or marine engines, but the experience developed in the electric stations, where the power can be closely measured, cannot fail to have a great effect upon all steam engine practice. The indicator alone, it would seem, can never more dominate steam engineering as it has been able to do in recent years. There is, of course, not the slightest hint that the days of the indicator are numbered, but simply that its sole evidence can never more be considered the only and final evidence.

A Recent Daring Invention.

There is no man in the world so daring, probably, as a chronic, psuedo mechanical inventor, and when one of the tribe gets hold of the idea that "we can't have too much of a good thing," there is no telling what may result. There are ball-bearings, for instance. If they are not good, what is? But they have at last been run into the ground, or run so near to the ground that it amounts to the same thing. A correspondent sends us a newspaper clipping, illustrating and describing a ball bearing railroad car. It has no wheels or axles, but just shoes parallel with the track and down close to it, with balls between, and a return raceway for the balls to run through from the rear to the front and begin again, and so keep the balls rolling. All sorts of advantages are claimed for the scheme, and no possible objections are visible to the inventor. The body of the car is brought down close to the ground. Nothing is said about what will happen to the balls when passing frogs and open joints. The following reasoning makes the car run fast and draw easy: "The car moving three times faster than the balls, their diameter being one-third of the circumference, is thus enabled to travel one hundred miles with the friction of but 33 1-3 miles, or as three to one. An engine will be able to haul its present train-load with one-third of the coal used at present, or a saving of two-thirds. Or with the same amount of coal now used will haul three times as many cars. It is estimated that over one hundred miles per hour can be made with the use of these trucks, friction being reduced to a minimum and the center of gravity thus lowered to a safety point."

Questions and Answers.

Name and address of writer must accompany every question. Questions must pertain to our specialties and be of general interest. We cannot undertake to answer by mail.

(12) "Chimney" asks: Having a boiler set close to a chimney with just about sufficient draft, if the boiler was set back fifteen or twenty feet from the chimney, with a horizontal flue, would it be necessary to increase the hight of the chimney, and if so, what would be the increase for, say, each five feet of horizontal distance? A.—We are of the opinion that there should, with the change suggested, be no appreciable difference in the draft of the chimney. In starting the fire with everything cold it might be necessary to burn a few shavings at the bottom of the chimney to heat the column of air, but after the fire under the boiler began to develop heat there should be no further trouble.

A Scalding Accident on the Cruiser New York.

If there is anything absolutely without excuse, and apparently utterly incapable of satisfactory explanation, it is the turning of live steam into a boiler where men are working. Such an "accident" would seem to be especially disgraceful when it occurs upon a ship of war, where every contingency has been thought out in advance and provided for, and where someone is directly responsible for every move that is made. Nevertheless, we have to record a most painful occurrence of this character on the cruiser New York at the Brooklyn Navy Yard. It is best at present to record merely the simple fact that on the morning of January 27 eight men were at work in one of the boilers, examining and cleaning it, when steam entered the boiler, scalding the men. It is evident that the steam did not enter in large volume or at high pressure, as all but one of the men were able to struggle out of the boiler, and although seriously scalded are expected to survive, and the one who was so overcome that he was not able to make his escape was rescued by a man who entered the boiler and dragged him to the manhole. This man died the next day. The steam was quickly shut off, showing that the operations were being alertly watched, and it is suggested that the accident was really caused by a leak in a pipe passing through a bulkhead. The facts of the case will of course be brought out by investigation.

Personal.

Mr. E. G. Buckwell has recently been engaged to take charge of the sales department of the Cleveland (Ohio) Twist Drill Company.

Prof. J. B. Johnson, of Washington University, St. Louis, has been appointed Dean of Engineering in the University of Wisconsin, Madison, Wis.

Mr. H. E. Brann, who for four years past has been foreman of the tool department of the Stanley Manufacturing Company, has resigned to become superintendent of the Draper Machine Tool Company at Worcester, Mass.

Mr. Joseph Irwin, New York manager for the Hill Clutch Company, Cleveland, Ohio, and for C. F. McMurray, Troy, N. Y., for the past ten years, associates himself, February 1, with the Webster Manufacturing Company. The field of his activities will continue largely the same as before—power-transmitting machinery.

Mr. Heinrich Calow, of the firm of Th. Calow & Co., Bielefeld, Germany, is in this country looking up new machinery, and expects to buy machinery for manufacturing shafting, and also the rough iron or steel bars from which to make shafting. Mr. Calow says that his firm has for three years past been using our American Southern iron, and that they find it better and cheaper than the German iron.

Obituary.

Herbert W. Chapman, a builder of fine machinery, especially engraving engines for bank-note and bond work, died in Newark, N. J., fifty-one years old. He was a native of England, and had been in business in Newark since 1873.

John McCune, the oldest machinist in continuous service of the Pennsylvania Railroad Company, died suddenly at Altoona, January 24. He worked side by side with Frank Thompson, now president of the company, when the latter was learning his trade in the Altoona shops.

One of the world's great engineers has just died in Russia, Gen. Michael Annenkoff, who built most of the Trans-Caspian Railroad begun by Gen. Skobeloff. He had a varied experience in the Russian army, attaining the rank of Colonel at twenty-eight years of age, before he attracted the attention of Gen. Skobeloff. He personally superintended the building of the division between Samarkand and Tashkend, where difficulties from drifting sands were encountered which his predecessor had declared insurmountable. He also solved the difficult fuel problem by adopting oil from the Baku wells for both locomotives and stations. In recent years Gen. Annenkoff had been devoting his attention to the Trans-Siberian Railroad.

The twenty-ninth annual meeting of the American Institute of Mining Engineers will be held in New York city at the house of the American Society of Mechanical Engineers, 12 West Thirty-first street, on February 21, 22, 23, 24 and 25, 1899. Further particulars regarding the meeting can be obtained from the secretary, R. W. Raymond, 13 Burling Slip, New York.

Perry Ransom, of Oshkosh, Wis., says that the disks used on his grinder, illustrated recently, are of steel instead of cast iron, and that steel is much better for the purpose.

Commercial Review.

NEW YORK, SATURDAY EVENING, January 28, 1899.

MACHINISTS' SUPPLIES.

Influences of inventory time, usually long drawn out and fondly to be dwelt upon as an excuse for delay of business, may well be forgotten this year. The first month's dealings may briefly be characterized as good-time trade. Satisfaction with orders and prospects is widespread through selling offices and croakers are lonely. Business of the month does not display a boom, but a maintenance of the condition to which it has gradually been working up, with a further broadening tendency. A sign of the times is the difficulty which several sellers report in getting goods from the factories. This state of affairs prevails in several twist-drill houses. A company engaged in the manufacture of certain other lines of small tools has just made two levies upon the stock of its New York representative, so as to fill orders from the home office. Among the industries commented upon by one or another leading seller as buying supplies freely are steam and trolley roads and electric and typewriter manufactories. One house reports a fair trade with bicycle manufacturers in tools and fittings; but taking the market throughout, that class of work does not cut much of a figure. Some of the makers of bicycle parts or fittings, finding a dearth of demand for their legitimate product, have set their machinery at work upon cap and set screws. The sensational splurge in quotations on copper has necessitated advances in brass goods generally. Iron valves and steam fittings have also gone up.

Montgomery & Co. report sufficient orders on hand for the Grobet files, manufactured in Europe, to keep the works running for a year. This has been the case, however, for the last few years.

POWER-TRANSMITTING MACHINERY, ETC.

Radical activity prevails among makers of transmission material, which denotes not only prosperity in that branch of industry, but in manufacturing industries generally. The orders on hand with a certain large local firm in the past ten days are reported to exceed those at any time within the previous ten years. Sales are well distributed. Silk mills and jewelers are mentioned as good buyers of transmission material, which is significant as to the jewelers, at least, in that it indicates that the people of the country are in a condition to purchase luxuries. Cement mills are reported busy and in the market for equipments. There is an excellent demand for rope drives, remarks one seller.

Export sales of power-transmitting machinery have been good. One house which has established an agency in Copenhagen reports very satisfactory returns therefrom. "We have also been shipping hangers to points in England," they remark, "where a year and a half ago the goods could not have entered. We have even sold shafting and fittings for Hong Kong." Another large house has agencies in Holland, Italy and one or two other European countries, and is receiving orders from those quarters. Good inquiries are coming from France. An order for shafting, etc., from Java has recently been filled by a company locally represented. Someone recently closed a contract to furnish a lot of power-transmitting machinery for Japan. Various Cuban sales have come to our notice. One was of a quantity of wood pulleys for a jobber's stock in Havana. Another comprised shafting, hangers, etc. The selling firm which sent the latter, A. Van Vechten & Co., have sold also a com-

plete outfit of laundry machinery, including an engine, for Havana parties. Evidently that city has already begun to imbibe much-needed ideas of cleanliness.

The Webster Manufacturing Company, Chicago, made an increase in its plant last year amounting to some $40,000, and now its facilities are as much taxed as ever. Among other work it is furnishing to the Nazareth (Pa.) Portland Cement Company an equipment of elevating, conveying and power-transmitting machinery. It has made a large shipment of rope drives, friction clutches, etc., for dynamo and turbine work in Japan. At the first of this month thirty or forty gas and gasoline engines of 2½ horse-power each were sent to Norway. The company has shipped an engine, pulleys, shafting, etc., to Ponce, Porto Rico, for a cigarette factory.

A wood pulley house reports sales of 1898 50 per cent. ahead of 1897, and the present month running better than the corresponding days of any other on record.

MISCELLANEOUS.

A prominent New York machinery sales house is reported just to have placed an order for thirty punching machines with an Eastern manufacturer.

A man from Philadelphia was conversing with a New York small tool seller not very long ago, and told of a manufacturing concern in the former city of which he had been made assignee or receiver. When the creditors came to examine the state of the business and perceived the outlook that it had, instead of forcing a liquidation, they chose to advance money to put it on its feet again. This was cited as a circumstance which could occur only in days of prosperity.

A few extracts from the half-yearly "Engineering Trades' Report" of Matheson & Grant, London, may show how the iron and machinery business is faring in England and what they think of American competition.

"The New Year opens with workshops busy and good prospects in all brances of the engineering trades, the revival which, in the autumn of 1895, followed and redeemed the depression of the preceding three years, having since merged into a steady and increasing activity. It is, however, to be noted, that while this activity is confirmed by the total Board of Trade shipping returns, the proportion of exports is less in proportion to imports than it was a year ago. This apparent anomaly of brisk trade and restricted shipments is due to the fact that much of the present prosperity arises from a home demand. But even in regard to exports the steel and engineering trades show better than most of the other trades in the country.

"Locomotives and Rolling Stock.—In no branch of trade has the reaction from the dull times of 1893-5 been more apparent. The growing mileage of the railways at home and their increasing traffic have caused a demand for haulage power beyond the capacity of their own engine-building shops, which have for so long usurped the functions of the manufacturing engineers. This demand, coming at a time when Indian, Colonial and foreign orders were pressing, has not only filled the locomotive factories with orders which will occupy them for the whole year, but has driven to the United States both English and Colonial customers. In regard to the continual comparisons made between American and British locomotives, it may be said that the permanent way and the engines must be considered together, and that American engines, successful as they may be in the country of manufacture, seldom give satisfaction on roads whether in Great Britain or elsewhere, designed and constructed in solid British fashion. Railway carriages and wagons are in as great demand as engines; prices have risen accordingly and the present commitments extend far into the coming year.

"Iron founders, mechanical engineers and machine-tool makers are almost all busy, either directly for the users or as subsidiary to the great leading industries above referred to. Electric lighting and power transmission, hydraulic machinery, arsenal equipment, gas engines, road locomotives, motor cars and machine tools are directions in which there is the greatest activity. The falling off in the cycle-making factories has set free many workmen for the lighter branches of engineering. American competition is apparent in all these departments and each country rapidly absorbs the novelties and improvements of the other.

"In conclusion it may be said that the two most striking events of the past half year as affecting engineers are, first, the great expenditure in battle ships, arsenal equipment and munitions of war, an expenditure which, unfortunately, is not reproductive though it may be immediately profitable; and secondly, the new competition with British home and Colonial trade of the American steel makers and engineers. The manufactories of the United States have at last overtaken and overstepped their own enormous home demands, and will for the future be the principal factors in international rivalry. During the coming year, however, their competition in Europe will be restricted by the great revival in the American home trade following the termination of the Spanish war, and by the rise in prices which is taking place."

A company in this vicinity engaged in the manufacture of a certain line of small machinery, which we are not at liberty to mention, is making additions to its plant which involve the purchase of some $30,000 worth of machine tools. A local house has already received orders for about seventy tools for this purpose, consisting largely of drilling and milling machines.

PITTSBURG REPORT.

There appears to be no slackening in the volume of business transacted, and prices have been holding a good, stiff position for some time. Everything seems to be moving along with the same steady stride it has been showing for the past few months, and not many complaints are to be heard from any direction. Steel mills in the Pittsburgh district have sold their product for the next six months, and no orders will be taken for delivery within that period. This is a most healthy condition—for the steel men. Buyers have to look outside this territory for material, and pay a little higher rate in order to secure their wants.

One big factor in the general trade circles which cannot be overlooked is the "combinations." There are many of these at present, and just what effect they will have on the different markets remains to be seen. Many believe it bad policy to organize such "trusts" when prosperity is rolling from sea to sea. The latest one reported is that of the chill roll and tinplate machinery builders. It is currently reported that at a meeting held in Chicago one day last week the principal makers of the above named materials agreed to sell all the product of their plants for the next year. Some statement has been made that the American Tin Plate Company had asked that no machinery be built for non-trust mills, but no verification could be secured for the statement.

Another leading feature of the iron and steel market is the enormous production of the mines, furnaces and mills of the country. From all quarters come reports that mills have broken records in producing. The cheapening of production, due to vast tonnage, is purely an American quality, and the inevitable tendency of the times is toward combinations which will allow of great reductions in cost accounts.

It is thought that the current year will witness a sort of boom in structural material, for the postponement of many operations in this line can no longer be palliated by the necessity of waiting for better days to come. At this moment, however, one can hear some excuse for postponement of repairs, plant enlargement, etc., in the cry, "Wait until we see what action is taken regarding our going into the trust." This is the principal reason for "putting off necessary repairs."

In the general machinery trade, business has shown a wonderful improvement. Dealers in all lines report greater demand, higher prices and a decidedly better feeling all around. Several big contracts for engines are hanging fire, as are also one or two in the boiler trade. Tin-plate machinery is being well taken care of by the many builders in this section of the country, prominent among them being the Mesta Machine Company, Lewis Foundry & Machine Company and the Frank-Kneeland Machine Company.

CHICAGO MACHINERY MARKET.

In its manufacturing aspect the machin-

ery trade continues to be all that could be desired. As remarked here by a machinery man, who attended the convention of the National Association of Manufacturers at Cincinnati last week, the condition of trade is forcibly illustrated by the fact that in the Cincinnati district there are now three or four new machine-tool plants being erected. The demand continues in excess of the supply, and new shops are going up to supply the deficiency.

In wood-working tools the best present trade seems to come from the smaller furniture shops, of which there are yet quite a number scattered throughout the West, in spite of the tendency of this as well as most other lines of manufacture towards concentration. Evidently the large furniture works are so well filled with business that there is a chance for the smaller plants, and to properly equip themselves for the trade that is in sight they are add-

(*Continued on page 40.*)

Miscellaneous Wants.

Advertisements will be inserted under this head at 25 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Gear Wheels, gear cutting, Grant; see p. 18.

Caliper cat. free. E. G. Smith, Columbia, Pa.

Forming lathes. Mer.Mach.T.Co.,Meriden,Ct.

For Sale, Cheap—Chest pattern or cabinet-maker's tools. Box 58, AMER. MACHINIST.

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Shafting straightener; state make, condition, capacity, price. Box 59, AMER. MACH.

Light and fine mach'y to order; models and elec. work specialty. E. O. Chase, Newark,N.J.

Book "Dies and Diemaking," price $1, post paid. J.L.Lucas,Prov.,R.I. Send for index sheet.

For Sale—Oval manhole cutting machine. Harlan & Hollingsworth Co., Wilmington, Del.

Wanted—2d-hand 10x5 screwcutting foot lathe. Ad. E., 1,034 Crosby st., Rockford, Ill.

"Brandt's Triple Expansion Gaskets" are the best for boilers. Randolph Brandt, 38 Cortlandt st., New York.

Geared punching press, No. 32, almost new, in good order, Toledo Machine & Tool Co., makers; $200. Geo. S. Sturges, Scranton, Pa.

American Machinists, 1880 to 1899, for sale, unbound, except 1880, which is in leather binding; will sell for $25. Address Box 72, AMERICAN MACHINIST.

Best workmanship; reasonable charges; watch, clock and other light machinery; punches and dies in sub-presses a specialty. Waltham Machine Works, Waltham, Mass.

I have a new hand tool for wood workers which has merit and will sell; wish to arrange with responsible parties for its manufacture and sale on a royalty basis, or will sell outright. F. W. Steele, 84 8th ave., West, Cedar Rapids, Ia.

Institutions retiring from business having machine tools, brass or wood working machinery will find it to their interest to correspond with us. We purchase complete plants or handle them on com. C. C. Wormer Mach. Co., 55-59 Woodbridge st., W., Detroit, Mich.

For Sale or Rent—Foundry and machine shop with additional land, in good condition and well equipped for medium heavy work: capacity of foundry 7 tons per day; located on railroad within eight miles of New York: terms easy. Call or address J. F. Sweasy, 26 Nassau street, New York.

Wants.

Situations and Help Advertisements only inserted under this head. Rate 25 cents a line for each insertion. About six words make a line. No advertisement under two lines accepted, and no advertisements abbreviated. The cash and copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded. Applicants may specify names to which their replies are not to be forwarded; but replies will not be returned. If not forwarded they will be destroyed without notice. Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents.

Situations Wanted.

First-class, experienced draftsman desires position. Box 56, AMERICAN MACHINIST.

First-class mechanical draftsman wants position. Box 71, AMERICAN MACHINIST.

Experienced designer of engines and general machinery seeks position. Box 61, AM. MACH.

Foundry foreman wishes position; experienced in both light and medium castings. Box 54, AMERICAN MACHINIST.

Mech. engr., first-class draftsman, 12 years' exp. in steam engineering and mining mach., open for pos.; best refs. Box 66, AM. MACH.

Foundry foreman, twelve years in one shop, had charge over 100 men, age 48, wants position, house or machinery; a hustler. Box 63, AMERICAN MACHINIST.

Foreman patternmaker, 34 years of age, wishes a change after March 1; good references; West or South preferred. Box 68, AMERICAN MACHINIST.

Draftsman and mechanical engineer, 20 years' varied exp., prac. designer of high-grade engines, tools, etc., desires situation. Box 29, AMERICAN MACHINIST.

Position wanted, in Boston or vicinity, by designer, preferably on automatic mech. or electrical machinery; many years' experience; references. Box 2,900, Boston, Mass.

Wanted—To represent manufacturer in Cuba, technical graduate, experienced engineer; references; salary or commission. Address Box 57, AMERICAN MACHINIST.

Position wanted by a practical mechanical engineer, well up on gas-engine work; competent to design, build and operate gas engines of any size or type. Box 60, AMERICAN MACHINIST.

Experienced mech. draftsman, general work, can superintend construction, also plan and superintend building construction, desires change; middle West preferred. Box 65, AMERICAN MACHINIST.

A practical and up-to-date mechanic, with 30 years' experience in the manufacture and sale of air-compressing and hydraulic machinery and tools, desires position with responsible concern. Box 55, AMERICAN MACHINIST.

Two men (merchant and mechanic), residing in Germany, wish to take the agency of first-class machinery and machine tools only, on a commission basis. For further particulars address Box 52, AMERICAN MACHINIST.

Position wanted as electrical or mechanical engineer with manufacturer, consulting engineer or contractor; tech. grad., 5 years' exp. in design, construction and instal. of elec. machinery. Address Box 48, AM. MACH.

A sober, active, reliable married man, 30 years old. A1 draftsman, tool and model maker, with a wide and varied exp., would like position as supt. or ass't in light mfg.; thoroughly capable of handling men to advantage; best ref. Box 62, AMER. MACHINIST.

Help Wanted.

Wanted—A first-class draftsman to redesign Corliss engines. Box 51, AM. MACH.

Wanted—A good machinist, an all-round man for general job work. Address Box 50, AMERICAN MACHINIST.

Wanted—Machinist in New York city or vicinity, to put together machinery; must have shop and fixtures. Box 53, AM. MACH.

Wanted—A foreman for jobbing machine shop employing from ten to twenty men. Address, stating salary and reference, Box 70, AMERICAN MACHINIST.

Wanted—Patternmaker; must be able to read and work from drawings; steady employment; reference; state salary. Box 69, AMERICAN MACHINIST.

Wanted—Foreman molder, foreman machinist and foreman shipbuilder (steel); state experience and salary expected; steady employment for right man. Box 49, AM. MACH.

Wanted—Good, bright and quick men on molding machines; permanent job if satisfactory; state experience, age and wages expected. Box 64, AMERICAN MACHINIST.

Wanted—Four vise hands and fitters on first-class machine-tool work; none but first-class workmen need apply. Address, giving experience, references, etc., Box 67, AMERICAN MACHINIST.

Wanted—Foreman for blacksmith shop running five fires, furnace and steam hammer; state wages desired and give references. Address The F. M. Davis Iron Works Co., Denver, Col.

Experienced mechanical draftsman wanted to work on Staten Island; must be able to make original designs and figure strains; apply by letter only. Address C. W. Hunt Company, West New Brighton, S. I.

Wanted—Two skillful machine-tool designers with long shop and drawing-room experience, also two men experienced in designing, manufacturing and selling compressed-air tools; good salaries and permanent. Designer, AMERICAN MACHINIST.

FOR LEASE OR SALE.

Manufacturing Plant, Bank Street, Cincinnati, O. Specially constructed of brick, 150 ft. x 100 ft. Four stories, high ceilings, light on all sides. Boiler, Murphy furnace, engine, shafting, heating. All complete. Apply to

THOMAS MORRISON & CO., Cincinnati, O.

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If you were as well posted technically as you are practically. Our courses will give you those portions of the theory of your trade which will enable you to advance. If you will devote some of your spare time at home to study, at a cost so low that you will not feel the outlay, we can help you to a better position. Thorough and practical courses by mail in

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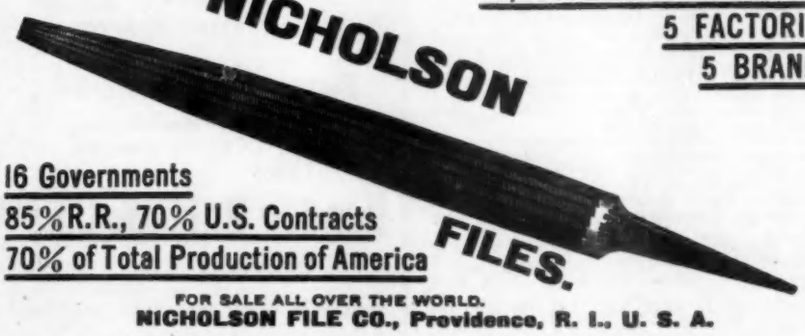
THE BURT MFG. CO.
AKRON, OHIO, U. S. A.

Largest Manufacturers of Oil Filters in the World.

NICHOLSON FILES.



76,800 DAILY PRODUCTION
5 FACTORIES
5 BRANDS

16 Governments
85% R.R., 70% U.S. Contracts
70% of Total Production of America

FOR SALE ALL OVER THE WORLD.
NICHOLSON FILE CO., Providence, R. I., U. S. A.

(*Continued from page 39.*)

ing quite freely to their machinery, now more or less antiquated by the neglect of several years. There is, however, a very good trade in wood-working machinery from all kinds of buyers.

Considerable attention is still being directed to the various Western States that have established bounties for the production of beet sugar within their borders. It is doubtful whether the production of sugar as a leading industry is yet past the experimental stage. The first year is usually non-paying for a plant of this kind, but it is said that in Michigan there are several large beet-sugar refineries which during their first year recently ended have made satisfactory returns on the investment. But machinery men are not reporting much new work from this source.

There is no branch of the Western machine trade that is more active at present than mining. The local works are running night and day, and even at double turn are unable to keep up with the large number of orders that come from all parts of the globe.

January ends with a satisfactory trade in iron-working machinery. On the whole, looking at it from the dealers' standpoint, the expected business of the next several months looks more inviting than the transactions that have actually been booked in January. But the latter trade was cramped by insufficient stocks, and there is no assurance that that difficulty will not continue.

The Q & C Company has recently opened its new shops, and is crowded with work even at its increased capacity.

The Walburn-Swenson Company expects in 1899 to double their output of 1898. Last year they built 100 cotton compressors, and are arranging this year for the construction of 200, besides the usual amount of other work.

Quotations.

NEW YORK, Monday, Jan. 30.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 75 @ 12 75
No. 2 foundry, Northern	11 50 @ 12 50
No. 2 plain, Northern	11 25 @ 12 00
Gray forge, Northern	10 50 @ 10 75
No. 1 foundry, Southern	12 50 @ 13 00
No. 2 foundry, Southern	12 00 @ 12 50
No. 3 foundry, Southern	11 50 @ 12 00
No. 1 soft, Southern	12 50 @ 13 00
No. 2 soft, Southern	12 00 @ 12 50
Foundry, forge, Southern	10 75 @ 11 00

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.15 @ 1.20c.; refined, 1.20 @ 1.30c. Store prices: Common, 1.35 @ 1.40c.; refined, 1.40 @ 1.50c.

Tool Steel—Base Sizes—Standard quality, 6 @ 7c., with lower prices on some brands; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 1.55 @ 1.60c.

Cold Rolled Steel Shafting—Base, sizes, from store in small lots, 2.15c. upward.

Copper—Carload lots, Lake Superior ingot, 16½c.; electrolytic, 16⅛ @ 16¼c.; casting copper, nominally, 16c.

Pig Lead—Carload lots, 4½c., f. o. b. New York.

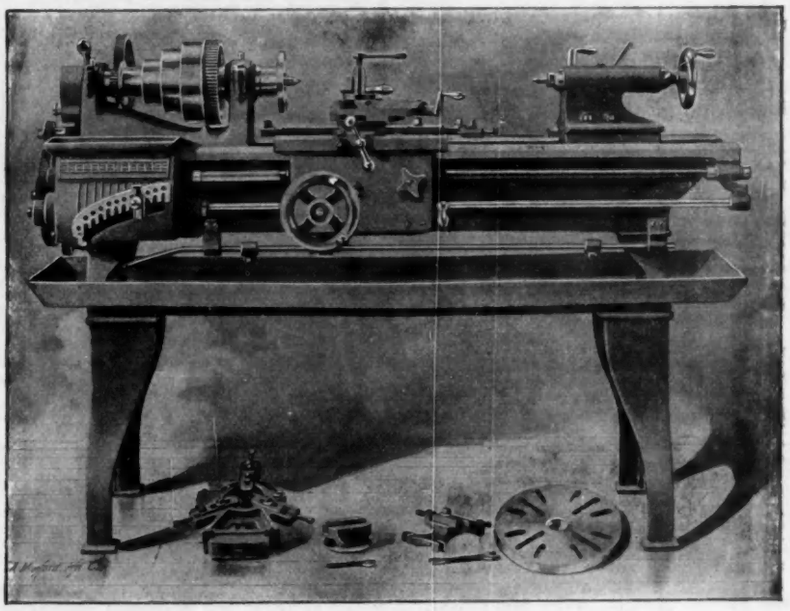
Pig Tin—For 5 and 10 ton lots, 24½ @ 24¾c., f. o. b. New York.

Spelter—In carload lots, 5.70c., New York delivery.

Antimony—In cask lots, 9¾ @ 10c. for Cookson's in casks and over, according to quantity; Hallett's and Japanese, 9 @ 9¼c.

Lard Oil—Prime city, present make, the leading brand, 46 @ 48c., in wholesale lots.

12-IN. HENDEY NORTON TOOL-ROOM ENGINE LATHE.



Complete in every respect as our larger sizes of lathes.

Especially designed for work in tool-rooms, experimental stations, and fine machine and repair shops. Fitted with either raise and fall or plain carriage. With or without improved taper attachment in connection with plain carriage.

This Lathe can be fitted with wire chucks in any decimal under half inch, which are invaluable for finishing small taps, reamers, special screws and studs, and other work right from the rod—no cutting off and centering of work required.

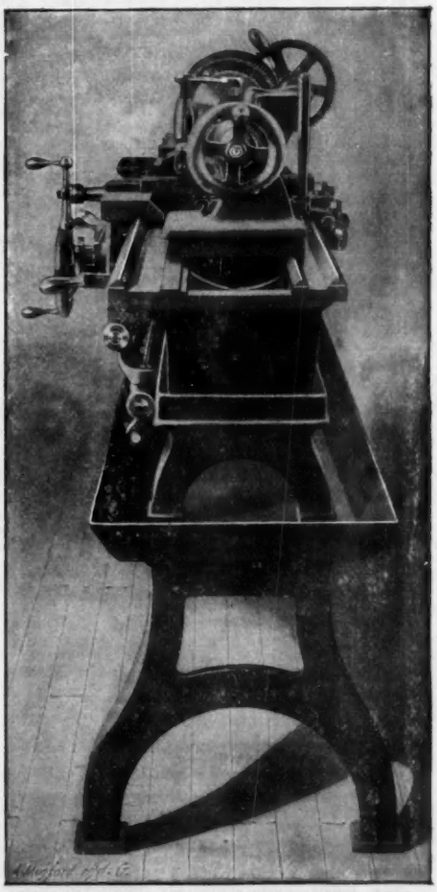
Cross-feed screw graduated to thousandths of an inch.

Beds made in 4 ft., 5 ft., and 6 ft. lengths.

The...

Hendey Machine Co.,

TORRINGTON, CONN.



END VIEW OF THE HENDEY-NORTON ENGINE LATHE.

Agents for the Pacific Coast: Pacific Tool & Supply Co., San Francisco, Cal.
J. W. Cregar, Philadelphia Bourse Exhibition.
European Agents: Schuchardt & Schutte, Berlin, Vienna, Brussels; Chas. Churchill & Co., Ltd., London and Birmingham, England. Adolphe Janssens, Paris, France.

Our Annealed Die and Tool Steel

Saves Time, Labor, Money.

Crescent Steel Company,

Pittsburgh, Pa.
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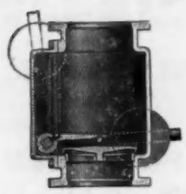
New York, N. Y.
Denver, Col.



Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

Jenkins Brothers, New York, Boston, Philadelphia, Chicago.

LOCOMOTIVE MECHANISM AND ENGINEERING.

Third edition, revised and enlarged. With an appendix on the Modern Electric Locomotive. By H. C. REAGAN, Locomotive Engineer. 12mo. Cloth. $2.00. Upwards of 450 pp. 226 figures, including many half-tones.

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53 East 10th Street, New York City.

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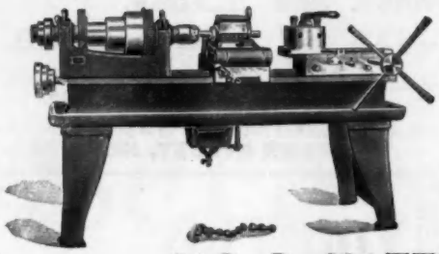

is made Automatic—especially designed for Ball Cranks, Pedal Pins, Balls, Rollers. Tapers turned to any length required, and all kinds Screw Machine work executed with greatest accuracy and rapidity.

"Double Headers" in Automatic Machines cost about 50 per cent. more, but turn out double the work.

Send all letters of inquiry to

JAS. D. MATTISON, Dexter, Maine.

ONE TRIAL
OF
HOBSON'S (FH) "CHOICE" TOOL STEEL
will convince any good mechanic of its superior qualities and value.

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HOBSON, SEAMAN & COMPANY,
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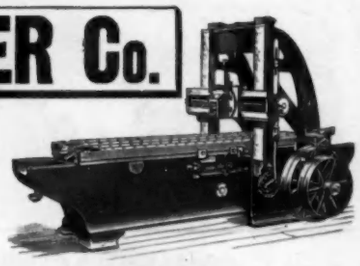
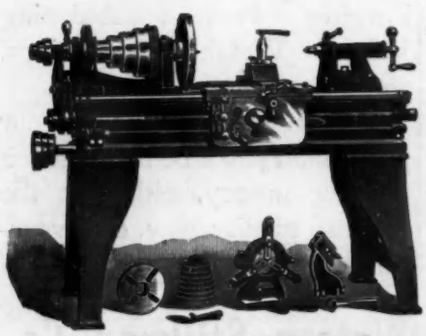
J. A. Fay & Egan Co., 26 South Canal St., Chicago, Ill.
Robinson & Cary Co., St. Paul, Minn.
W. R. Colcord Mchy Co., 502 North 2d St., St. Louis, Mo.
Parke & Lacy Co., Fremont St., San Francisco, Cal.
The Fairbanks Co., 705 Arch St., Philadelphia, Pa.





"Sebastian" Lathes

(13 and 15 inch swing).

Beds Any Length Desired.

High grade, modern lathes at a low price. Each lathe is provided with both screw and rod feeds, as well as power cross feed. Gears to cut all standard threads from 5 to 36 are furnished.

Workmanship, material and design are of the highest order.

You can't find anything better.

We also make a specialty of Screw Cutting Foot Lathes.

Sebastian Lathe Company,

117 & 119 Culvert St., Cincinnati, Ohio.

AGENTS.—Selig, Sonnenthal & Co., London, England. Jn. Tragardh & Co., Goteborg, Sweden. E. Sonnenthal, Jr., Berlin, Germany. R. S. Stokvis & Zonen, Rotterdam, Holland.

Manufacturers.

The Cyclone Woven Wire Fence Company, Waukegan, Ill., will erect a factory soon.

Caskey Bros., Newport News, Va., are to rebuild the foundry recently destroyed by fire.

Levi Rose, of Hamilton, O., will put up and operate a sixty-barrel flourmill at Ripley, O.

The American Pipe & Foundry Company proposes to enlarge its plant at Bessemer, Ala.

It is stated that the Davis & Furber Machine Company, of North Andover, Mass., may erect a new foundry.

William Steele & Son are taking estimates on a factory for E. Holden & Co., at Margaret and Dittman streets, Frankford, Philadelphia, Pa.

G. W. Neff, a brick manufacturer of Portsmouth, O., has obtained options on several pieces of ground in Johnstown, Pa., preparatory to erecting a plant there.

It is announced that the Cramp-Hoadley syndicate has made an offer for the entire works and property of the Corliss Steam Engine Company, of Providence, R. I.

The Arcade Manufacturing Company, of Freeport, Ill., will build an addition, 40x120, in the spring. This will enable the company to increase its force from 140 men to 215.

B. F. Phelps and M. Goldberger, of Ft. Wayne, have secured an option on the plant of the Akron Iron & Steel Company, which burned eighteen months ago, and expect to rebuild it.

The North Cornwall (Pa.) Iron Company's furnace was so badly damaged by the recent explosion that it will require to be rebuilt. The work of dismantling and reconstructing the plant will begin at once.

Architects Spier & Rohns have awarded contracts for the erection of a five-story brick factory for the Detroit Graphite Manufacturing Company, to be built on the east side of Twelfth street, Detroit, Mich.

Berrick Bros. have the contract for the construction of a new radiator manufacturing plant on Clinton street, Buffalo, N. Y. It will be 70x100 feet in size. Mr. Harris, formerly of the Standard Radiator Works, is putting up the plant.

The Ireland & Matthews Manufacturing Company will build a brick addition to their factory at the northeast corner of Wight street and Mt. Elliott avenue, Detroit, Mich. It will be 30 by 95 feet in size and three stories high.

Contractors Macey, Henderson & Co. have been awarded the contract for the erection of the three-story brick truck shop for the J. G. Brill Car Company, Sixtieth and Woodland avenue, Philadelphia, Pa. The building will measure 57x165 feet.

The factory known as Ludw. Loewe & Co., Electrical Department, Berlin, Germany, has passed into the hands of another firm, and will be known as "Union Elektricitaets Gesellschaft," which company will take over all agreements made by or for the electrical department of the first named concern.

S. B. Miller, a civil engineer, of New York, is in the city of Detroit, preparing the plans for the new plant of the Continental Match Company, on the west side of Cass avenue, Detroit, Mich. In addition to the large factory building formerly occupied by the Bolles wire works, a new building will be erected of brick, 80x300 feet in size, and three stories high.

On November 22 the Niagara Falls Power Company made a contract with a new electro-chemical company, which has been organized by the men interested in the Oldbury Electric Chemical Company, for 800 electrical horsepower, to be delivered by March 1 next, for the operation of a new electro-chemical plant,

to be built on the Niagara Falls Power Company's lands near the Oldbury Electro-Chemical Company's plant.

The Michigan Portland Cement Company, whose factory is located near Coldwater, Mich., has just entered into a contract for a large extension of the plant. The new building, which is to be constructed of steel, will be 80x350 feet, and when completed will double the present capacity of the plant, and give employment to 150 men. The material for the new building is to be on the ground within eight weeks. The total cost of the improvements will exceed $100,000.

It is known among officials in the construction department of the Northern Pacific Railway that the plans have been completed for the new machine and repair shops at West Superior, Mich., as well as the new roundhouse which the road has for several years contemplated building in South Superior. The site selected by the company has already been cleared, and it is expected that the work of construction will begin in the spring. The shops when built will be used as the repair shops for this division.

The Detroit Sugar Company, Detroit, Mich., has been incorporated with $500,000 capital and the following directors: T. A. Parker, F. H. Walker, Cameron Currie, W. L. Holmes, George Hendrie, Julius Stroh and E. H. Parker. The new company, it is stated, will succeed to all the rights of the Oakland Sugar Mill Company. A factory site will probably be chosen near Pontiac. Contracts will shortly be let for the necessary buildings and plant, it is said, to be ready October 1.

A reorganization of the Michigan Iron Works, Grand Rapids, Mich., has been effected and the plant, which has been idle for some time, will be put into shape for operation at once. Articles of incorporation will soon be filed, with the following as incorporators: William T. Powers, trustee; Frank A. Richards, F. C. Powers, Fred W. Powers, C. H. Gleason, A. L. Banks, J. W. Spooner and C. W. G. Everhart. The officers of the company will be: W. T. Powers, president; Fred W. Powers, vice-president; J. W. Spooner, secretary-treasurer. The capital stock of the company will be $50,000, of which $30,000 is paid in.

Plans for the erection of a four-story brick machine and repair shop, 193½ by 60 feet, for the Baldwin Locomotive Works, on the south side of Buttonwood street, Philadelphia, Pa., have been submitted to the Building Inspection Bureau for approval. Macey, Henderson & Co. have the contract for about $40,000, and have started to demolish the old building, preparatory to starting work on the new structure. The same contractors have been granted a permit to build a two-story machine and smith shop on Hamilton street for the same company. The building will be 169 by 102 feet and will cost about $44,000.

The Cincinnati Machine Tool Company have purchased all the machinery, patterns and the whole plant, together with the business formerly operated by A. H. Kerkhoff & Co., of Cincinnati, Ohio, and will at once proceed in manufacturing tools formerly made by this firm. There will be immediately an enlargement of the plant and the facilities, together with improvements in the tools, so as to place them foremost in their line. The personnel of the Cincinnati Machine Tool Company consists of August H. Tuechter, who for the past fifteen years has been identified with the Bickford Drill & Tool Company, and Mr. Sherman C. Schauer, who for the past ten years has been superintendent of the Hamilton Machine Tool Company. The new concern commences business with orders ahead, running the plant in full for three months, and they will be glad to have catalogs from all the other manufacturers to place on file for future use and reference.

YOUR CATALOG IS WANTED.

The personnel of our firm is August H. Tuechter, for the past fifteen years with the Bickford Drill & Tool Co. and Sherman C. Schauer, for the past ten years with the Hamilton Machine Tool Co. We are now established at Western Avenue and Dayton Street, Cincinnati, Ohio, where we will be glad to have you call on us or send us your communications. We will build Upright Drills from 20 to 40 inch swing and as we need additional Machinery and Supplies at once we beg our friends to forward their catalogs promptly.

CINCINNATI MACHINE TOOL CO., Western Ave. and Dayton St.,
CINCINNATI, OHIO, U. S. A.

BALLS FOR ALL PURPOSES

And from ANY material.

Any size from 1-16 to 10 inches.

We have had more experience in ball making than any other concern in the country. If you are having any trouble with other makes write

THE GRANT BALL COMPANY, Cleveland, Ohio, U. S. A.

ASTONISHING VALUE—HACK SAW BLADES.

Per Gross, $5.00.

8 or 9-inch, per dozen, 57c., post paid.

Send for ill. list 835 of other bargains of which the above is sample, showing how you can save up to 50% on your tools.

THE FRASSE CO., 21 WARREN STREET, NEW YORK.

Do You Bore Cylinders?

Horizontal Boring Machines our Specialty.

READY FOR IMMEDIATE DELIVERY.

1—9 foot Table, 5 inch Bar Machine.

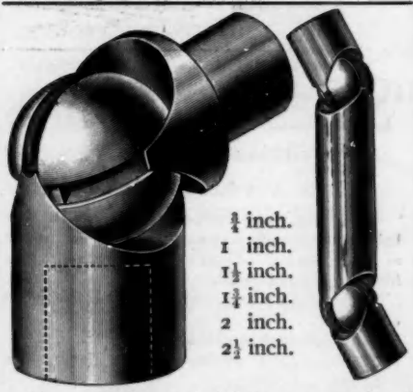
FOR PROMPT DELIVERY.

1—3½ foot Table, 2⅜ inch Bar Machine.

Newark Machine Tool Works,
NEWARK, N. J.
Cable address: "Rinsse," Newark, N. J.

CLEVELAND GEAR WORKS,
W. R. SAWYER, Lessee.
86 SENECA STREET,
CLEVELAND.

GEARS of all descriptions



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Address:
Vanderbeek Tool Works, Hartford, Conn.

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from the great number of Jacks—257—the Watson-Stillman Co. make, that they make nothing but Jacks.

That isn't so. Their output of Hydraulic Tools is something enormous, and they make a large variety of other good tools, such as Shears, Straightening Presses, Broaching Presses, Duplex Steam Pumps, Electric Motor Lifts, Tube Expanders, Forging Presses, Reducing Valves, Weighing Machines, and many others.

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